



FRIDAY, NOVEMBER 3, 1876.

THE UNITED STATES INTERNATIONAL EXHIBITION.

XIV.

SIGNALS CONTINUED.

JOHN BRIERLY & SONS' SYSTEM OF INTERLOCKING SWITCHES AND SIGNALS.

Adjoining the model of Messrs. Saxby & Farmer, Messrs. John Brierly & Sons exhibit one of their system of interlocking switches and signals. As the principle of all systems of interlocking signals is substantially the same—the only difference between them being in the mechanism employed—it will be unnecessary to elucidate it further, as it has been fully explained in previous articles.

It should be mentioned that, besides the model referred to,

and lower periphery. These slots or grooves allow of the backward and forward motion being communicated to the levers by the operator, and the notches catch the lever at each end of the slot or groove, so that they cannot be moved either way when they have once entered the notch. The motion of the levers when being pulled backwards and forwards along the helical slots communicates a partial rotary motion to the drums or barrels.

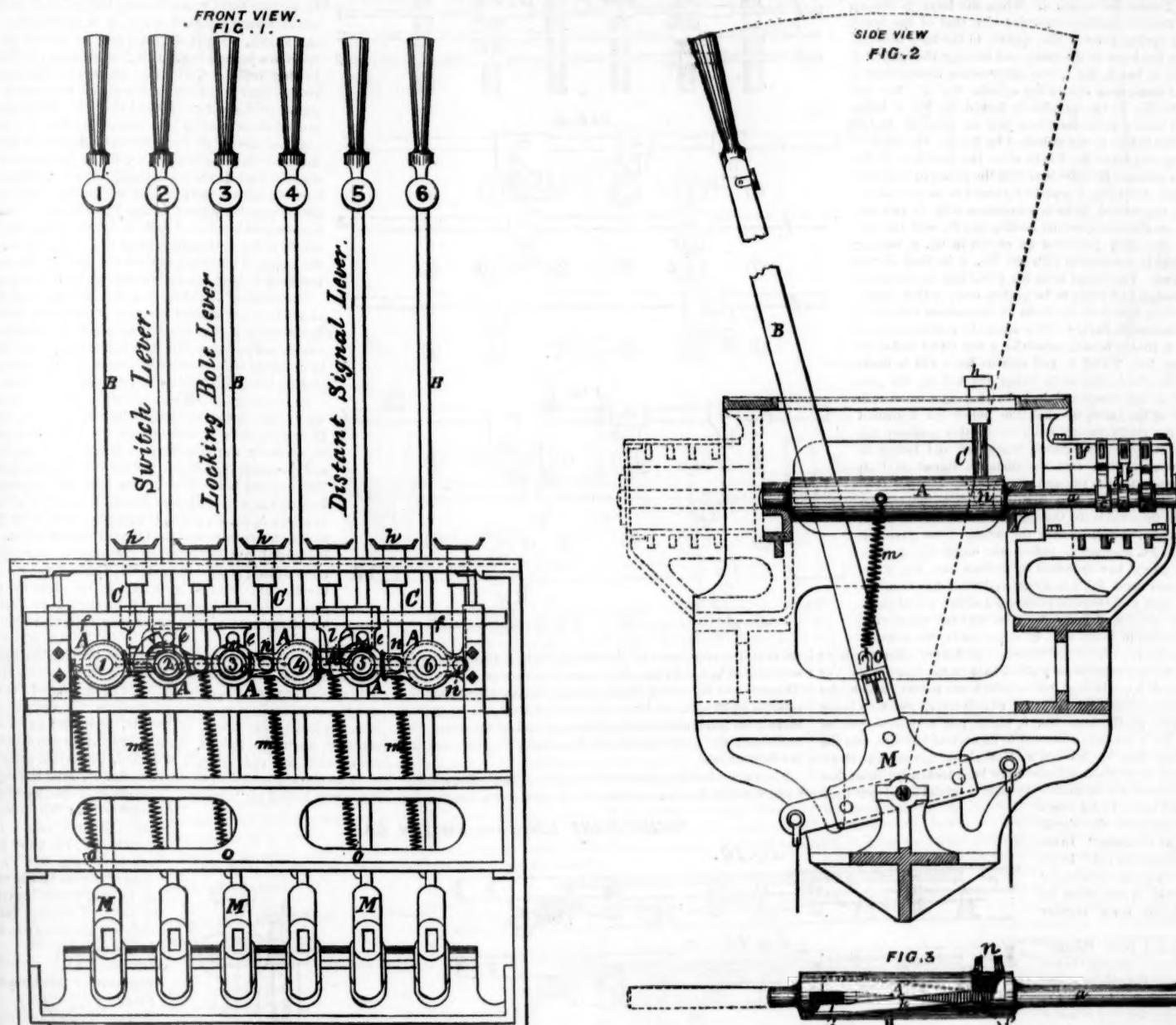
In order to free the lever from the notches a vertical rod, *C*, figs. 1 and 2, having a flat head, *h*, and serving as a depressor, is pivoted to the forward end of the drum or barrel at *n*, and on pressure being brought to bear on the depressor (from the foot of the operator, or otherwise) the barrel will be caused to turn a portion of a revolution, so that the notch *i*, fig. 3, will be disengaged from the hand lever and the latter thus be left free to be moved backwards and forwards along the helical or diagonal slot.

In order to bring back the barrel to its original position, on the pressure being removed from the depressor, a helical spring, *m*, is attached to the opposite side of the barrel, and is made fast to the lower extremity of the hand lever at *o*, so that immediately the pressure is removed from the depressor (and the lever has made its traverse along the helical slot and

the notch in the drum from the lever, and consequently the lever cannot be moved. But when the casting *i* is moved into the position shown at spindle 2, bar 1, fig. 6, then it is obvious that the tail piece *g* is released, and the spindle and drum may be revolved by the depressor and the lever disengaged from the notch which holds it in its position.

Other forms of locks are shown in figs. 4, 5, 6 and 7. The "Wenover" lock is shown in all these figures on spindle 2, bar 3. When the casting *m* is in the position shown in figs. 4 and 6, it is plain that the tail piece can engage into the notch in the casting, and the spindle be revolved and the lever thus be unlocked, but when *m* is in the position shown in fig. 7, the spindle cannot be revolved, and the lever is therefore locked. The "back lock" is shown on spindle 5, bar 1. It consists of a tail piece, *g'*, which engages with a piece, *l'*, as shown in fig. 7, so that the bar 1 cannot be moved to the right when *g'* is in the position represented in fig. 7. The "compound lock," shown on spindle 5, bar 1, is a combination of the "stand lock," "Wenover lock" and "back lock."

From this description it will be seen that the interlocking of one lever in relation to another is performed entirely by the movement of the barrels which secure the levers, and is independent of the movement of the levers themselves. Before a



The above firm also exhibit a set of six signal levers of full size. Their model shows a double line junction similar to that of Messrs. Saxby & Farmer, so that in order to give a clear idea of the Brierly system it will only be necessary to describe the mechanism employed. This the firm have done very fully in their descriptive circular, from which much of the following description is quoted:

In the accompanying engravings, fig. 1 is a front elevation of the lever frame, with small portions of the front plate removed to show the locking parts. Fig. 2 is a transverse vertical section of fig. 1, showing the general connection of the several parts of the apparatus; and fig. 3 is a top view of the barrel, showing the form of the peculiar diagonal slot and notches in the same.

The switches, points and signals are worked by hand levers, shown in figs. 1 and 2, as is usual in all methods of working interlocking signals. These hand levers are inserted into sockets *M* at their lower ends, which are pivoted on to fixed bearings *N*, fig. 2, so as to enable the upper ends of the hand levers to be moved backwards and forwards, their lower ends remaining at the fixed point. At a short distance above their lower extremities the levers pass through hollow drums or barrels, *A*, (shown separately in plan in fig. 3) which have helical or diagonal slots or grooves, *k*, and notches *i*, formed in their upper

reached the notch at the other end of the slot) the spring will pull back the barrel into its normal position, and lock the lever in its new position.

The locking and interlocking of the signals, points, locking bolts and switches is operated from the drums or barrels, *A*, which are numbered 1, 2, 3, 4, 5 and 6 in fig. 4, and is effected by means of the spindles, *a*, which form the axes of the drums, *A*. On to these spindles *a* are keyed or riveted one, two or more narrow collars, *c*, figs. 2 and 4, some of which have studs, *d* (see fig. 4), projecting from the upper portion of their peripheries. The studs *d*, called "pullers," engage into forked pieces, *e*, keyed or screwed on to reciprocating or sliding locking bars, *f*, placed above or below them. The locking bars are shown in figs. 1 and 2, and are arranged side by side in two rows, one above and the other below the spindles. In figs. 4, 6 and 7 the bars are shown, one placed below the other so as to show the position of the locks more clearly. Some of the collars, *c*, on the spindles are furnished with tail pieces, *g*, which serve as locking pieces.

The locking of these is effected by the castings, *l*, which are firmly attached to the locking bars, *f*. When the castings *l* come immediately above and at right angles to the tail pieces *g*, as shown at spindle 2, bar 1, fig. 5, it is impossible to turn the spindle and drum with the depressor and thus disengage

lever can be moved it must be released, and it is the action of the releasing apparatus which interlocks other levers, or else when the throw of a lever is completed it must be secured in its position before it will lock or unlock any other lever, so that the action of the interlocking apparatus is either before or after the movement of the lever itself.

An important feature in the mechanism described is that the twist of the helical slot *k* in the drum *A*, fig. 3, is only equal to the depth of the notches *i*, so that the movement which is lost to the drum by the depression of the treadle *h* is regained by the curve in the slot; that is to say, when the lever has been pulled over from the notch *i* and has almost entered the notch *i'*, the barrel will be in the same position as when the lever rested in the notch *i*. This constitutes an important feature of this apparatus.

In order the better to illustrate the system of locking, interlocking and back locking, the action of the apparatus will be described, using for that purpose three of the six levers on the frame, fig. 1, viz., Nos. 2, 3 and 5, No. 2 being the switch lever, No. 3 the locking bolt lever, and No. 5 the distance signal lever, the movements of the locks being distinctly shown in figs. 4, 5, 6 and 7. In order to move No. 3, fig. 1, or the locking-bolt lever, it is first necessary to push down the depressor or treadle *h*, which will partially rotate the barrel *A* towards the right

hand, release the lever No. 3 from the notch *i*, fig. 3, in the barrel, and admit of the lever being pulled forward along the helical slot *k* until it reaches the notch *i'*. The barrel will then, owing to the twist in the helical slot *k*, occupy the same position that it did before the slot *i* was disengaged from the lever. As soon as the latter reaches the slot *i'* the barrel will be pulled sharply over to the left by means of the helical spring in figs. 1 and 2.

The hand lever will therefore be caught in the notch *i'* of the barrel *A*, and will be immovable. The effect of this will be that the "puller" *d*, fig. 4, which is attached to the spindle shaft of No. 3, will also rotate towards the left (see bar 1, fig. 6), taking with it the reciprocating rod *f*, and the several locks which are attached to the rod, namely, the portion *l* of the "stand lock" No. 2, which will unlock spindle 2, and the "compound lock" on No. 5, which will lock spindle No. 5, as may be seen by reference to fig. 4 (normal position) and fig. 6 (altered position). The switch lever No. 2 will then be released by this motion of No. 3, and No. 2 is now free to be pulled over after having pushed down its treadle, *h*, which will rotate the band 2, so as to release lever 2 from the notch *i*. When the lever is thrown back until its position coincides with that of the notch *i'*, the spring rotates the spindle to the left, thus securing the lever in the notch and moving the puller *d*, spindle 2, bar 2, fig. 4, into the position represented in dotted lines, thus unlocking spindle No. 5. But the spindle No. 5 was previously locked by No. 3 being pulled over; it is therefore just as securely locked as it was before it was unlocked by No. 2. The effect of pulling over lever No. 2 is to alter the position of the switch points. In order to re-bolt the points in their new position, lever No. 3 must be returned to its normal position, the several locks in connection with it and bar No. 1 on the reciprocating locking bar *f*, will then resume the same positions as shown in fig. 4, leaving the locks in connection with bar No. 2 in their dotted positions. The signal lever No. 5 will now be completely unlocked and ready to be pulled over, which operation being complete, the locks in connection with No. 5 and attached to bar *f*, will assume the positions shown in fig. 7, that is to say, barrel No. 2 will stand locked by spindles Nos. 3 and 5, and spindle No. 3 will be backlocked by No. 5, the latter being effected by the portion *g* of the compound lock butting against tail-piece *l* of the same, so that the puller No. 3 cannot move the reciprocating rod *f*. In this position the road is complete, the points being set and bolted in their new position, and the distance signal at "all right" ready for the passage of a train.

It will be easily seen from the above description that it is impossible for the signal man on duty to make any mistake by pulling over the wrong lever first; for instance, No. 2 cannot be pulled over until No. 3 (the locking lever) has unlocked it; neither can No. 5 be pulled over until No. 2 is secure and No. 3 has been returned back to its normal position; and the act of pulling over No. 5 back locks No. 3, so that the whole system is secure in every way. In other words, No. 5 being the signal lever (the signal is always at danger when the lever is in its normal position or pushed back in the frame), No. 3 or locking-bolt lever is then free to unlock the points, which being done unlocks No. 2, or the switch lever, which on being pulled over partly frees No. 5, which may be pulled over as soon as No. 3 has been returned to its normal position, and the signal may then be lowered to "all right," giving line clear. The signal lever No. 5 will also have back locked No. 3, so that the signalman will be unable to make a mistake and put back the switch point to its original position until the signal is again at "danger." In order to return the road to its original state the motions of the several levers must be reversed in their regular order.

It has not been thought necessary to illustrate the action of more than three of the six levers shown in the accompanying figures, it being considered that the making and signalling of a road at a junction would amply demonstrate the various movements of locking apparatus peculiar to this system.

Another point to which attention is called by the Messrs. Brierly is the great facility for locking afforded by this mechanism, as it is possible to utilize not only the upper and lower sides of the spindles of the barrels, but also both ends of these latter, as may be seen by the dotted lines in fig. 2. Great difficulties have frequently arisen through the impossibility of satisfactorily locking and interlocking large numbers (upwards of seventy) of levers.

The switch-locking apparatus and the locking-bar to

DIAGRAMS OF MOVEMENTS OF LOCKING BARS.

FIG. 4.

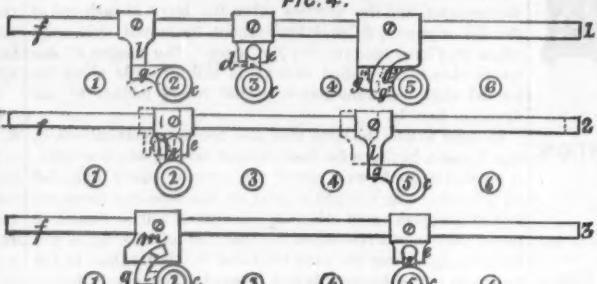


FIG. 5

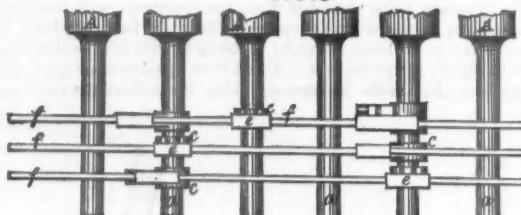


FIG. 6.

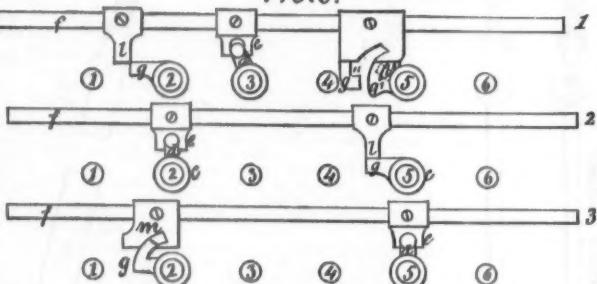
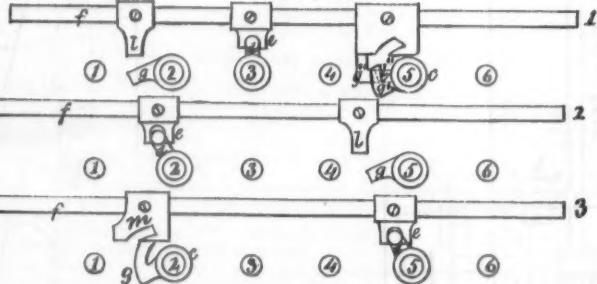


FIG. 7.



prevent the movement of the switch while trains are passing over it used by the Messrs. Brierly are represented in figs. 8-13. The object of the switch-locking apparatus, as was explained in relation to Messrs. Saxby & Farmer's system, is to prevent them from being accidentally displaced, and at the same time to prevent the signalman in the box from doing his work in a careless manner.

The switch-locking apparatus consists of two bolts, *c*, figs. 8 and 9, which have a movement up and down imparted to

them by a horizontal bar, *d*, which, with the locking bolts, works inside of a hollow cast-iron box (shown in section in figs. 8 and 9) which answers for a cross tie, *a* are the permanent rails, and *b*, *b* the switch rails which must be opened or closed for the passage of a train to or from the main or branch line of rails. The horizontal bar has two inclines, *d* and *d'*, on its upper and lower edges, and having a horizontal movement imparted to it, the locking bolts are moved either up or down as may be desired. The bar *d* is actuated by the bell-crank *e* and rod *e'*, which are operated from the signal box (by the signal-man in charge) in the usual manner.

In order to prevent the switch from being moved while a train is on it, a locking bar, *g*, figs. 10, 11 and 12, similar to that employed by Messrs. Saxby & Farmer, is used, but it is operated in a different manner. Figs. 10 and 11 are longitudinal sections taken between the rails and representing the locking bar, *g*, *g*, in two positions. Fig. 12 is a plan of a switch, and fig. 13 is an enlarged cross section of the rail and locking bar, *g*, showing the manner of making the attachments.

The mode of working is as follows: The switch rails, *b*, locking bolts, *c*, and locking bar, *g*, being in the position shown in figs. 8 and 11, it is desired to change the switch, so that the train may be moved from the main to a branch line. It is first necessary to lower the locking bolts, *c*, *c*. This is effected by the signalman pulling over that lever in the signal box, which is connected to the bell crank and rod *e*, *e'*. This would have the effect of pulling the horizontal bar *d* from the position shown in fig. 8 to that indicated in fig. 9; at the same time the inclines *d*, *d'* on the horizontal bar *d* would pull down the locking bolts, *c*, *c*, which would leave the switch rails free to be pulled over into the dotted position shown at fig. 9; when the horizontal bar *d* would be pushed back to its original position as shown in fig. 8, thereby raising the bolts *c* by means of the incline *d* pushing against the slot in the bolts *c*, and thus locking the switch rails in their new position.

The motions of the locking bar shown in figs. 10 and 11 are precisely similar to those of the bolts shown in figs. 8 and 9, and as the rods or levers for working the switch bar are connected by a bell-crank *f* (see fig. 12) to the same rod as works the bolt *c*, the motions of the locking bar *g* and locking bolt *c* are simultaneous.

The locking bar *g* is secured or firmly held on to the top of the slotted vertical sliding bolts *c*, *c*, figs. 10, 11 and 13, through which passes the horizontal bar *d* in precisely the same manner to that used for raising and lowering the bolts, and shown in figs. 8 and 9. The vertical bolts *c*, *c* which hold and support the locking bar *g* slide up and down in bearings attached to a clip, *h*, fig. 13, which is clipped on and holds firmly to the underneath portion of the permanent rail *a*. The horizontal bar *d*, owing to its length, is supported upon rollers, *i*, figs. 10 and 11, which greatly reduce the friction. The bar *d* is held in its place by small pins, *t*, fig. 10, placed above the rollers *i*, so that the bar *d* cannot rise from constant contact with the rollers *i*.

The horizontal bar *d*, figs. 8 and 9, for working the locking bolts, and the horizontal bar *d*, figs. 10, 11 and 12, always act together, so that when the bolts *c*, *c* of figs. 8 and 9 are up and the switch rails consequently locked in the desired position, the locking bar *g*, figs. 10 and 11, is down; and on the contrary, when the locking bolts *c* are drawn down and the switch rails are consequently unlocked, the switch bar *g* will be in an elevated position, as shown at fig. 10, and the signal is securely locked at "danger."

Therefore, if the locomotive runner allows his train to pass while the switch rails are unlocked, he must have done so in the face of the "danger" signal and in passing he will inevitably crush the elevated locking bar *g*, which will therefore be a tell-tale against him.

COMPENSATING APPARATUS FOR THE WIRE OF DISTANCE SIGNALS.

It is at all times a source of great trouble to signaling engineers to operate distance signals efficiently in all weathers, whatever be the temperature of the atmosphere, owing to the expansion and contraction of the wires by which the signals are moved. To obviate the difficulties growing out of the variation in the length of the wires due to changes of temperature, Messrs. Brierly have devised the apparatus illustrated in fig. 14. Instead of one wire they employ two, which are attached to the ends *a*, *a'* of a *L*-shaped lever *A*, so that the semaphore arm instead of being moved by a pull one way and a slack out of the wire when the lever is put back to its normal position is moved each way by a distinct pull on

FACING POINT LOCK AND SWITCH BAR.

Fig. 10.

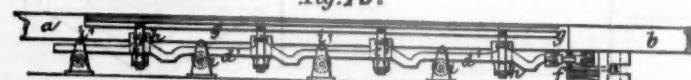


Fig. 11

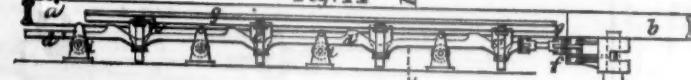
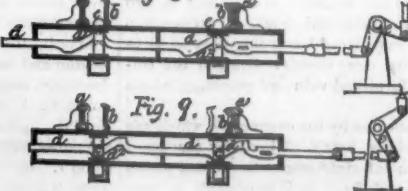


Fig. 12.

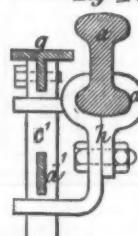


Fig. 8.

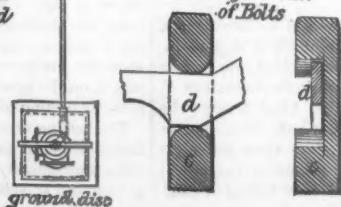


The switch-locking apparatus and the locking-bar to

Fig. 13.



Enlarged View of Bolts.



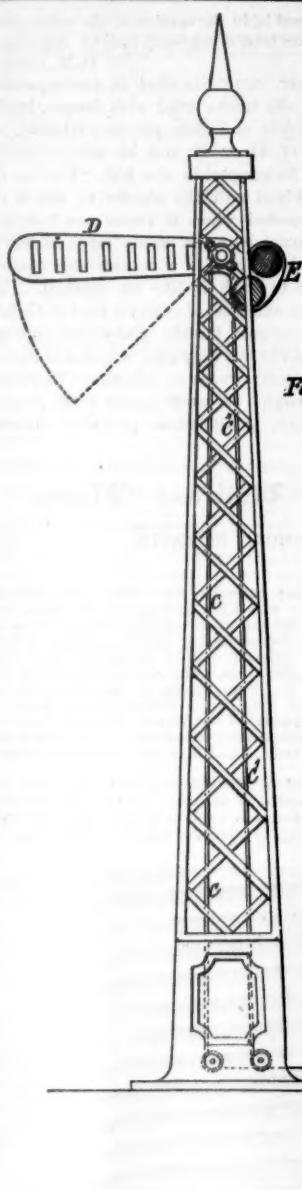
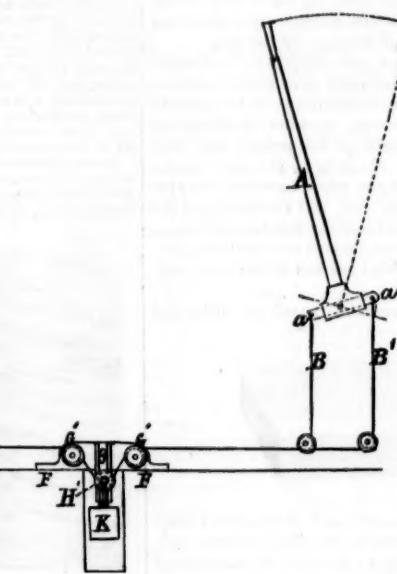


Fig. 14.

WIRE COMPENSATOR FOR DISTANCE SIGNALS.



one of the two wires. The wires are made to pass over the fixed pulley G' , attached to an cast-iron frame, F , then under the movable pulley H' , whose axis can slide up and down in the groove g . A weight, K , is attached to this pulley, which keeps the wires taut as they expand or contract. Figs. 15 and 16 represent two enlarged views one a side elevation and the other, fig. 16, a plan of these pulleys and the frame to which they are attached. From the plan it will be seen that there are two sets of these pulleys, one for each wire. The two movable pulleys H and H' each have separate weights, and can move up and down in the grooves g , g independently of each other. The wires after passing under the pulleys H and H' pass over the pulleys G and G' , and from thence to the semaphore posts, where they are made fast to rods, one of which pulls up the semaphore arm so as to indicate "danger," while the other rod depresses it to indicate "all right." The semaphore arm is counter-weighted by means of the "spectacles" E , fig. 14, which it carries and thus if by accident the wires should be severed, the arm D will be thrown up into the position of "danger," as shown in the engraving.

Supposing it is desired to indicate that the line is clear, the signalman will put the lever A into the dotted position, in doing which he will draw upon the wire B , at the same time slackening the wire B' . The tension put on the wire B will draw down the rod C , and with it the semaphore arm D , to its lowest position. If now it is desired to change the signal to "danger," the signalman will reverse the motion of his lever, moving it into the drawn position. He will thus slacken the wire B , and draw upon the wire B' , thereby drawing down the rod C' , and raising the semaphore arm D , together with the rod C .

The exact position of the raised arm will be determined by and correspond exactly with the amount of motion given to the hand lever A . Thus, as the throw of the lever is completed, the arm D will rise to its full height and indicate "danger."

Supposing the wire B should break at any portion of its length, the weighted pulley K would fall, and the weighted pulley K' , being no longer counterbalanced, would draw down the rim C and thereby raise the semaphore arm D to "danger." If, on the other hand, the wire B' should break, the tendency of the

AUDIBLE ALARM RAILWAY SIGNAL.

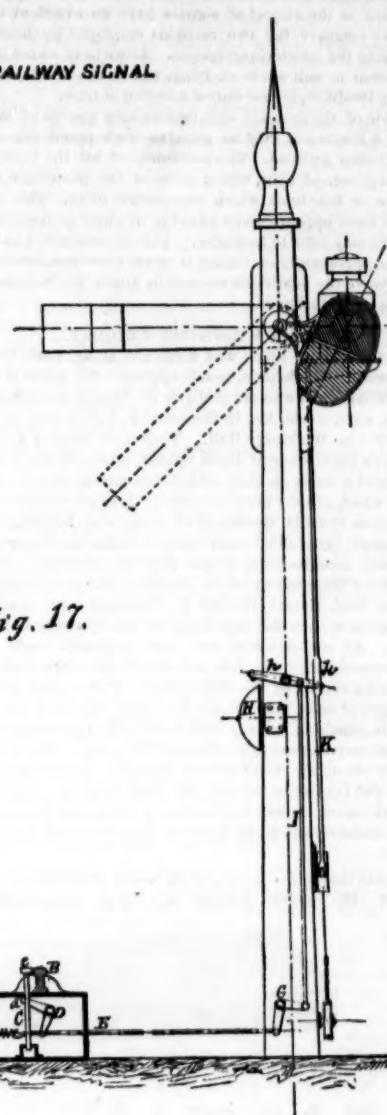


Fig. 17.

THE AUDIBLE ALARM SIGNAL.

The object of this invention is to appeal to the hearing of the locomotive runner or conductor of a railroad train as well as to his sight, so that should the signal arms or lamps be obscured by fog, mist, snow, or bad weather generally, there shall be no excuse for running past the danger signal.

This object is attained by attaching to the signal or other convenient post a gong, H , fig. 17, which is operated by means of a stud or rod, C , which is elevated so as to come in contact with the flanges of the wheels when the semaphore arm is raised to "danger" and is depressed so that the wheels will not touch it when the semaphore is lowered to "line clear." In the engraving A is a hollow sleeper placed beneath and partly supporting the rail B . The stud C is placed at one side of the rail and works in a vertical direction in bearings in the sleeper A . On the top of the rod C is a semicircular head, c , which is

intended to receive the blows from the wheels of the passing train. At the point d the rod C is slotted to receive one arm of a bell-crank lever D , the other arm of which is attached to a horizontal rod, E . One end of the rod E is secured to a powerful spring, F , the other end being made fast to another bell-crank lever, G , which is connected to the striker h of the gong H by the rod I . One end of the striker h is inserted into a slot k in the rod K , the slot k being of sufficient length to admit of the play of the striker h as it strikes the gong H . While the apparatus is in the position shown in the drawing the wheels of a passing train will strike the head c of the rod C and depress it; this motion will be immediately communicated to the striker h through the rods E and I , and a loud clear sound will be emitted from the gong. On the pressure being removed from the vertical rod C the spring F will cause the whole apparatus to resume its original position, where it will remain until acted upon by the next wheel that may pass over it. When the semaphore arm is lowered to the position shown in dotted lines in the drawing the rod K will move upward, thereby depressing the striker h on to the gong, and consequently lowering the rod C into such a position that the wheels of a train will pass clear of it. The gong will, therefore, when no danger is to be apprehended, be perfectly silent.

The models of this firm and of MESSRS.

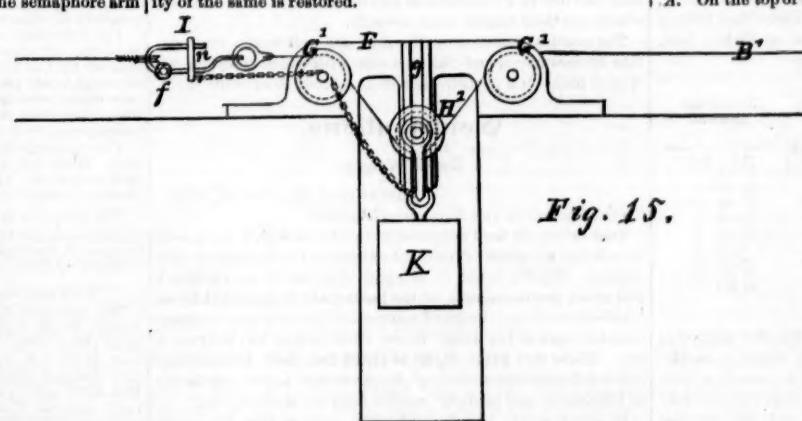


Fig. 15.

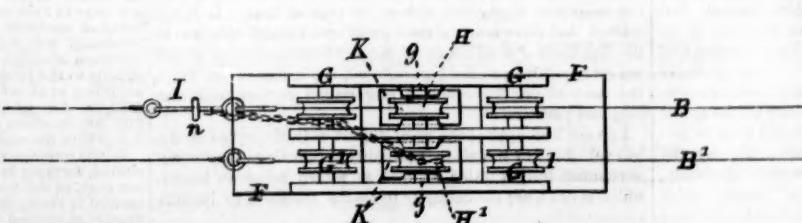


Fig. 16.

Saxby & Farmer being side by side in the exhibition, persons interested in the subject of signals have an excellent opportunity to compare the two methods employed by these firms in working the interlocking system. As we have stated before, the system is well worth studying, and its use in this country, in many localities, is now only a question of time.

Outside of the grounds the interlocking system of Messrs. Toucey & Buchanan may be seen at work practically on the Pennsylvania Railroad. The movement of all the Centennial trains is governed by it, which includes the passenger traffic of three or four lines which concentrate there. This system has had some improvements added to it since we described it, which we may refer to hereafter. Persons interested in it can have the opportunity of seeing it work there practically, and may observe the admirable manner in which the movement of trains is controlled by it.

HOOPE & TOWNSEND'S EXHIBIT.

This firm, whose office and works are at No. 1,330 Buttonwood street, Philadelphia, nearly opposite the Baldwin Locomotive Works, and who are probably the largest manufacturers of bolts, nuts, rivets, &c., in the country, have a very interesting exhibit in Machinery Hall. They have erected a square pavilion or office made of black walnut, on the inside of which is arranged a series of bins, which contain specimens of the articles which are the principal part of their productions, while on the sides or walls specimens of house and building irons, car forgings, turn-buckles and elevator chains are displayed.

The nuts manufactured by this firm are punched cold. It being still a disputed question whether cold or hot-punched nuts are best, Messrs. Hoopes & Townsend have taken especial pains to show the superiority of their process of manufacture. As cold-punched nuts were originally made there were grave objections to their use on account of the roughness of the holes caused by the broken fibres of iron; but after an experience of more than twenty-five years this firm has succeeded in punching holes in cold iron which apparently for all practical purposes are as good as drilled holes. The holes in the nuts which are exhibited are punched at right angles to the top and bottom of the nut, and while there is a slight concave and convex surface the bearing is even and there are no imperfections or fins to be taken off after the nut leaves the machine.

It is said that one objection to the use of cold-punched nuts is that the holes instead of being cylindrical are

are heavy enough, and made to work with sufficient accuracy, so that the iron in being punched is subjected to direct vertical pressure alone without exerting any lateral or bursting strains in the iron. The effect is that the metal is compressed and thus made more dense and stronger. That some such action takes place seems probable from the appearance of the holes in the nuts, which are straight and almost as smooth as though they were drilled. It would be very interesting if the effect of their method of punching on other qualities of metal, such as iron and steel boiler plates, could be investigated carefully.

In order to show the effect of punching upon the lamina of the metal, this firm exhibit a number of specimens of nuts which have been planed in two and the sectional surfaces then subjected to the action of acid. Fig. 2 has been engraved from one of these. It will be seen that the lamina have all been bent downward by the action of the punch, the nut having been punched with its top downward. It is claimed that the effect of this is that the iron has a greater power of resistance, owing to the lamina being bent, so as to stand at an inclination to the bolt, and that as the bolt and nut are subjected to strain the latter will as it were grasp the former more tightly.

Cold punching is also said to be cheaper in two ways, first there is no cost for heating the metal, and second the holes are left perfectly clean, whereas a hot-punched nut is always covered with more or less scale. The effect of this is that the taps used for cutting the threads are worn out much more rapidly in cutting hot than in cutting cold punched nuts, and Messrs. Hoopes & Townsend say that they have tapped at their works twelve tons of cold-punched nuts with a single tap without any sensible loss of gauge and without wearing out the tap.

They exhibit specimens of hot and cold pressed nuts which have been immersed in acid, and which show to the disadvantage of the former. They also exhibit some tests made by Messrs. Riehle Bros. on their testing machine in Machinery Hall to show the relative strength of hot pressed and cold punched nuts. There are ten rods of $\frac{1}{8}$, $\frac{1}{4}$, and $\frac{1}{2}$ in. diameter, with the thread used by this firm cut on each end, and with a hot-pressed nut screwed on one end, and a cold-pressed nut on the other, each of less than one-half the standard thickness. In each case the thread of the hot-pressed nut was "stripped" by the rod, while the cold-punched nut was not strained sufficiently to fix it on the rod.

This firm use the standard number of threads for bolts and

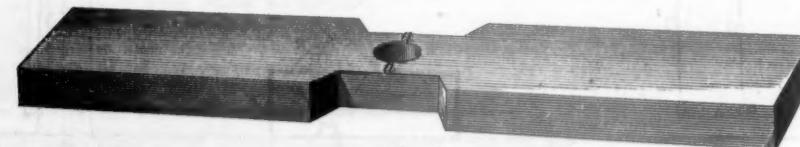


Fig. 1.

conical—that is, are larger in diameter on one side of the nut than on the other. This difficulty, however, seems to have been entirely overcome by Messrs. Hoopes & Townsend by their process of punching, as the nuts exhibited are so nearly cylindrical that no difference in size could be detected between one side and the other by any ordinary instruments for measuring.

They say in favor of their method of manufacture that better iron is required than is needed in hot punching; because if poor iron is used it will be split in the process of punching, and that if the latter is properly done, the metal around the hole, instead of being weakened, is in reality strengthened. In order to prove this, at the suggestion of the writer, they prepared a number of pairs of test pieces similar to that represented in fig 1. These were made of bar iron $1\frac{1}{2} \times \frac{1}{2}$ in., and one of each pair had a hole $33\frac{1}{2}$ in. diameter drilled and the other specimen the same sized hole punched in it. The specimens were then planed down next the hole as represented in the engraving, so as to leave a thickness of $7\frac{1}{2}$ in. on each side of the hole at a , a . The other pairs had $\frac{1}{4}$, $\frac{3}{16}$ and $\frac{1}{8}$ in. respectively. These specimens were then broken by subjecting them to a tensile strain in one of Riehle Bros. testing machines, with the following results:

Thickness of bar.	Thickness inside of hole.	Punched bar broke at	Drilled bar broke at
$\frac{1}{8}$ in.	$7\frac{1}{2}$ in.	27,130 lbs.	27,470 lbs.
"	"	28,000 "	28,000 "
"	$\frac{1}{4}$ "	18,820 "	18,000 "
"	"	18,730 "	17,590 "
"	$3\frac{1}{16}$ "	14,590 "	13,230 "
"	"	15,420 "	13,750 "
"	"	10,670 "	9,320 "
"	"	11,730 "	9,580 "
$\frac{1}{2}$ in.	$\frac{1}{4}$ "	31,470 "	28,000 "
"	"	31,380 "	26,950 "

From the engraving it will be seen that it was the portion of the iron immediately next to the hole, and which is usually supposed to be most affected by the action of the punch or drill, which had to resist the strain. It will be seen that in every case, excepting the first, the punched bars had the greatest strength, indicating that the punching had the effect of strengthening instead of weakening the iron. These experiments have given results just the reverse of similar experiments made on specimens of boiler plates; but Messrs. Hoopes & Townsend argue that it is due first to the kind of material used, which is a tough and ductile iron, and second to the method of punching. If a brittle and granular iron was used the effect of the punching would be to crumble or disintegrate the iron in the immediate vicinity of the action of the punch, or if the punches and dies employed were so proportioned as to have a tendency to split open the bar, the metal around the hole would also be strained injuriously, but in manufacturing nuts they use a punch which fits accurately into the die, and the machines employed

nuts given in Haswell's Engineer's and Mechanic's Pocket Book. This differs slightly from the Franklin Institute standard in the number of threads to the inch in some sizes of bolts, and also in the angle of the thread. The threads are round at the top and bottom, similar to the Whitworth thread, instead of being flat like the Franklin Institute or Sellers' thread. The angle of the sides is $52\frac{1}{2}$ degrees. This form of thread is used by Messrs. Hoopes & Townsend because they believe that a nut holds better, that is, is less liable to strip the thread or burst, than if the angle were greater, as is the case with the Franklin Institute standard. They also claim that a tap the threads of which are rounded top and bottom will last longer so as to do accurate work than one with the Franklin Institute thread, which is flat at the top and bottom and which therefore has sharp corners which will not stand but will soon become worn by use.

Messrs. Hoopes & Townsend also make a specialty of boiler rivets, to which they have given the title of the "Keystone" brand. Specimens of these are shown riveted up and planed in half, and others are hammered and bent into all sorts of forms, which test their quality most severely.

The articles exhibited by this firm are well worth examination by consumers, and the neatness with which they are arranged makes it a pleasure as well as a profit to examine them.

Contributions.

Dead Weight.

SHELBY CITY, Ky., Oct. 23, 1876.

To THE EDITOR OF THE RAILROAD GAZETTE:

Your article on dead weight of railroad cars will, I hope, help to call the attention of railroad owners and managers to this subject. Hoping to aid in bringing this matter into notice, I will cite a single example of the inadequate load carried by an eight-wheeled car. Railroad companies limit the load of eight-wheeled cars to ten tons. Some allow twelve, but the rule is ten. These cars weigh 20,000 to 24,000 lbs. Now, the ordinary city truck used upon cobble-stone pavements and on our levees at Cincinnati and St. Louis carries from six to eight tons.

In other words, two four-wheeled wagons take the entire load of our best eight-wheeled car and transport it over the roughest city pavements. Upon an eight-wheeled car we load forty iron rails weighing 600 lbs. each. The city wagon carries twenty or twenty-two rails as its regular load. Is it not evident that there must be some great mechanical blunder in the distribution of materials in the eight-wheeled car if it will not carry safely upon the best railroad track more than twice the load of the four-wheeled city wagon carried upon the roughest pavements?

I do not lose sight of the great difference in the speed of the two vehicles, but submit that (admitting that there is economy in running freight trains as fast as fifteen miles an hour—which is not true) the disparity in load is too great to be thus accounted for.

The difference of speed is, in the opinion of the writer, compensated by the rougher form of road-way used by city wagon.

D. M. LEWIS.

[Mr. Lewis, we fear, compares what is incomparable. Let him imagine his city trucks fitted with flanges, loaded as they are on the streets, and then put on railroad, not singly but in trains of 30 or 40, and he will, probably, feel that they would be unequal to the test. That is, the greater speed, combined with the shocks to which the vehicle must be subjected when it forms one link in a chain, liable to be struck with the whole force of 200 or 300 tons moving behind it with a considerable momentum, would be liable to crush it like an eggshell. Cars weighing ten tons can and often do carry a load of 15 tons with perfect safety over good tracks. But the average car must be calculated to run not only over a well-maintained road, but over the worst tracks in America. That notwithstanding, they might be made lighter while preserving all needful strength, is altogether probable.—EDITOR RAILROAD GAZETTE.]

General Railroad News.

ANNUAL REPORTS.

Central Pacific.

The report is for the calendar year 1875. The mileage owned by the company was 1,213 throughout the year, precisely the same as during the previous year; but there was an increase in the mileage leased during the year from 74 to 96 miles, and the total mileage worked during the year thus varied from 1,287 to 1,309 miles. The chief lines forming this mileage are the main line from Ogden to San Francisco, 883 miles, the 151 miles of the Oregon Division from Roseville northward, and the 146 miles of the Visalia Division from Lathrop southward, the latter being extended by the leased section of the Southern Pacific, which has this year been extended to Los Angeles.

The equipment owned by the company and with which this mileage is worked consisted at the close of 1875 of 203 locomotives, 260 passenger-train cars (115 first-class, 72 second-class and smoking, 31 sleeping, 19 mail and express and 23 baggage

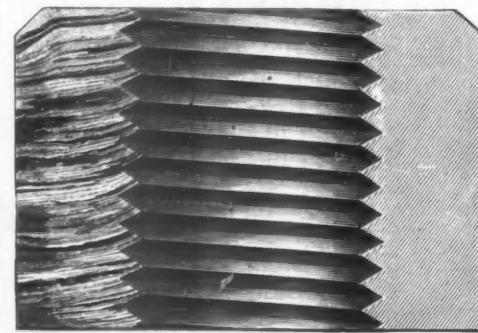


Fig. 2.

cars); 3,687 freight-train cars (2,124 box freight, 1,499 platform and 64 caboose cars); and 321 service cars (1 director's, 1 superintendent's, 1 pay, 193 section, 110 dump, 5 track-laying, 2 wrecking cars and 8 snow plows), besides 233 hand-cars. There is thus one locomotive to 6 miles of road owned (and 6.46 miles worked), one passenger-train car to 4.67 miles owned and 5 miles worked, and one freight-train car to 0.329 miles owned and 0.364 miles worked, or 3.03 freight-train cars per mile of road.

The company owns also 9 ferry steamers, with tonnage varying from 384 to 1,989 tons, and 16 river steamers from 102 to 1,272 tons, and 12 barges. During the year 15 locomotives, 8 sleeping cars, 24 first-class and 20 second-class passenger cars, 9 caboose cars, 64 combination box freight cars, 25 section cars, and 14 hand cars were added to the equipment. All the cars but the sleeping cars were manufactured in the company's Sacramento shops, where also 9 combination box cars were constructed to fill vacant numbers. Of the platform cars, 37, equipped with tanks and used as water cars, should properly be classed with service cars.

The ferry stock was increased by three steamers, much larger than the old ones, and with a total tonnage exceeding by a quarter that of the other six. One of them carries twenty loaded freight cars and the cattle from 20 stock cars at a load. The two others were transferred from the river to the ferry service. Two other river steamers were sold and four steamers and four barges were broken up.

The company also has a land grant which originally amounted to 11,722,400 acres, of which at the close of 1875 412,000 had been sold. The sales that year were 29,255 acres at an average of \$5.60 an acre.

This property is represented by:

Capital stock (\$44,745 per mile) \$54,275,500
Company's bonds (\$46,612 per mile) 55,390,000
Government bonds (\$22,923 per mile) 27,885,680

Stock and bonds (\$113,344 per mile) \$137,921,180

The company does not pay the interest on the Government bonds, which will be not due from it, principal and interest, until about 1900. Of the other bonds, \$600,000 bear 8 per cent. and \$2,983,000 7 per cent. interest—all the rest 6 per cent. The annual interest on the company's bonds amounts to \$3,363,230 gold per year, or at the rate of \$2,778 per mile of road owned. Compared with the previous year, there is an increase of \$669,000 in the 6 per cent. gold bonds. There is no change in the capital stock. Of this, \$8,333,300 is held in trust for the company, which is at the rate of \$6,870 per mile, while there is \$1,782,095 in the sinking funds for the redemption of the bonds—\$1,470 per mile. This reduces the capital account per mile to \$105,094 per mile. At the close of the year the value of material and supplies on hand was reported to have increased \$925,000, while the balance of accounts outstanding in excess of obligations decreased \$2,225,000. The cost of additions to the property is reported (besides this increase of supplies) at about \$1,200,000 for improvements of road, etc., \$592,000 for additions to equipment, \$22,000 for real estate, \$107,000 for shops and machinery. There was a decrease of \$248,000 in the cash on hand.

In the tonnage and tonnage mileage company freight is included, forming in 1875 22 per cent. of the tonnage and 12% per cent. of the tonnage mileage. The number of passengers carried is vastly increased and the average passenger journey greatly shortened by including the passengers by the Oakland

Ferry, only the merest fraction of whom use the cars. **Eighty-six per cent.** of the passengers were ferry passengers. The ferry is four miles long, and if we leave out the mileage of these

The work of the year was:

Train mileage:	1875.	1874.	Increase.	P. c.
Passenger.....	1,386,281	1,331,204	54,077	4.0
Freight.....	3,218,724	2,860,136	349,588	18.5
Miscellaneous.....	366,596	309,822	56,774	15.5
Switching.....	705,829	704,279	1,550	0.2
Total.....	5,676,030	5,214,441	461,589	8.1
Tons carried.....	1,184,131	1,096,287	87,844	8.0
Tonnage mileage.....	316,593,000	280,395,918	36,197,778	12.9
Passenger carried.....	4,762,314	3,862,720	899,586	23.3
Passenger mileage.....	168,347,800	134,307,087	35,040,713	25.3
Average train-load:				
Passenger, No.	112%	101	20%	20.0
Freight, Tons.....	98%	94	4%	5.0

passengers, we have an average journey of 224 miles for each railroad passenger, instead of 354. The tonnage mileage for the two years was divided among local, through and company freights as follows:

	1875.	1874.	Increase.	P. c.
Local.....	121,287,704	109,735,748	11,547,046	10.5
Through.....	180,609,621	132,415,084	18,484,557	14.0
Company.....	44,411,281	38,244,606	6,166,675	16.0
Total.....	316,593,000	280,395,918	36,197,778	12.8

The tonnage mileage of paying freight increased 12.4 per cent. Of the entire amount of paying freight, 44.6 per cent. was local in 1875, against 45.3 per cent. in 1874, and 52.9 per cent. in 1873.

The earnings and expenses reduced to currency were sold during the average rate at which currency earnings were sold during the year, were:

Earnings:	1876.	1875.	Inc. or Dec	P. c.
Freight.....	\$9,938,303 58	8,493,465 97	Inc. \$1,444,837 61	17.0
Passengers.....	5,897,942 14	4,983,694 84	Inc. 914,323 30	18.3
Express.....	282,073 29	237,981 06	Inc. 45,092 23	16.3
Mail.....	242,141 70	260,661 92	Dec. 8,525 22	3.4
Miscellaneous.....	177,188 26	166,877 01	Inc. 10,324 34	6.0
Sleeping cars.....	187,788 39	164,425 05	Inc. 23,373 34	14.2
Telegraph.....	155,218 05	122,049 74	Inc. 33,168 29	27.2
Rental.....	83,407 77	57,419 06	Dec. 4,011 28	7.0
Baggage.....	62,809 85	55,008 98	Inc. 7,800 87	14.2
Mileage.....	84,182 79	.....	.....	.....
Totals.....	\$17,021,015 79	\$14,531,355 36	Inc. \$2,489,660 43	17.1

Expenses:	1876.	1875.
Superintendence.....	\$61,837 83	\$47,833 98
Station service.....	44,949 20	49,952 11
Telegraph service.....	198,581 73	165,621 53
Train service.....	539,648 50	448,921 98
Sleeping-car service.....	29,000 12	23,565 54
Ferry service.....	229,937 84	229,333 42
Locomotive service.....	1,000,864 44	1,570,372 42
Wharf service.....	44,356 77	.....
Repairs of track.....	1,501,666 27	1,006,145 60
" snow sheds.....	37,562 79	99,129 58
" bridges.....	50,995 94	34,606 98
" buildings.....	65,780 93	88,187 73
" docks.....	42,649 71	12,219 80
" locomotives.....	538,331 43	474,332 18
" cars.....	653,358 96	441,778 71
" tools and machinery.....	.....	8,214 51
" snow plows.....	.....	326 01
Office expenses.....	187,023 13	175,157 57
Stationery and printing.....	44,647 96	44,775 54
Advertising.....	18,986 73	12,407 20
Loss and damage (freight).....	21,014 12	22,878 40
Damage (persons).....	57,187 17	44,837 72
Miscellaneous.....	32,056 50	28,603 18
Water.....	57,496 75	55,737 58
Insurance and loss by fire.....	54,027 87	37,481 68
Leased railroads.....	467,586 17	39,410 37
Mileage.....	77,445 52	.....
Totals.....	\$7,417,944 43	\$5,818,977 23

Earnings over operating expenses..... \$5,663,071 36 \$5,682,378 14

Compared with the previous year there is an increase of \$1,568,967.21 currency in working expenses, equivalent to 26.8 per cent., and an increase of \$920,688.22 in net earnings, or 10.6 per cent. The chief increases in expenses were in those for maintenance, the different items under the head of repair amounting to \$2,993,000 in 1875, against \$2,249,000 in 1874. In repairs of track alone there was an increase of 37 per cent., and in repairs of cars one of 48 per cent.

The main items of expenditures and their percentage of the total expenses were as follows in 1875:

Locomotive service.....	26.8	Train service.....	7.1
Repairs of track.....	20.3	Station service.....	6.5
" cars.....	8.8	Leased railroads.....	6.3
" locomotives.....	7.3	Ferry service.....	3.5
These together form 85.6 per cent. of the total working expenses.			

The payment of

Interest..... \$3,216,819 61

Dividends (10 per cent.)..... \$5,427,560 00

A total of..... \$8,644,369 61

absorbed all but \$958,700 of the net earnings, which also are charged \$401,000 of taxes, \$395,000 "general and miscellaneous expenses," besides legal expenses, etc., which more properly belong to operating expenses. This income account seems to be made up in two kinds of money, gold and currency. If we subtract "taxes," "general and miscellaneous," "legal" and "civil engineering" expenses from currency "earnings over operating expenses," we have left, on the assumption that these expenses were all currency, \$8,674,876 as the available net earnings; if they were all gold (probably most of them were gold, for only 3 per cent. of the road's other working expenses were currency), this sum is reduced to \$8,535,650 in currency; in either case a little less than the interest and dividend payments. The net earnings, on the latter supposition, would have paid the entire interest on the government bonds, (not due yet) as well as that on the company bonds, and then have been sufficient to pay a dividend of 5.86 per cent. currency on the capital stock.

The yearly interest on the government bonds is equivalent to a little more than 3 per cent. gold on the capital issued, including the \$8,333,300 held in trust for the company.

The following figures will help to form an idea of the amount of traffic, earnings, etc., in a form easily compared with other roads:

Per mile:	1875.	1874.	1873.
Gross earnings.....	\$13,096	\$11,980	\$11,354
Expenses.....	5,706	4,822	4,595
Net earnings.....	7,387	7,158	6,759
Percentage of expenses.....	41.41	40.25	40.47
Passenger train mileage.....	1,066	1,022	1,109
Freight train mileage.....	3,476	2,365	2,255
Passenger mileage.....	129,498	110,723	99,159
Tonage mileage.....	243,534	231,159	204,096
Average:			
Earnings 3.27 cts.	3.52 cts.	3.65 cts.	
Expenses 1.35 "	1.42 "	1.48 "	
Profit 1.92 "	2.10 "	2.17 "	
Earnings 3.65 "	3.57 "	3.66 "	
Expenses 1.51 "	1.44 "	1.48 "	
Profit 2.14 "	2.13 "	2.17 "	

The traffic of the road, as shown by the train mileage, is equivalent to 1.46 passenger trains and 3.90 freight trains each

way daily, including Sundays, over the entire mileage of the road.

The following interesting statements of mileages of cars of different classes, and of the cost of repairs per mile run, are not usually given in annual reports:

Miles Run by Cars.	1875.	1874.
Sleeping cars.....	1,597,940	1,485,413
Passenger cars.....	3,491,675	3,446,855
Baggage, mail and express cars.....	2,736,341	2,506,646
Emigrant cars.....	2,652,830	2,195,398
Officers' ".....	51,858	37,497
Freight ".....	34,060,314	31,826,312
Foreign ".....	11,977,716	6,758,211
Total.....	56,568,674	48,368,302

Cost per Mile Run for Repairs (in Cents).	1875.	1874.
Sleeping cars.....	3.93	2.75
Passenger cars.....	2.77	1.78
Baggage, mail and express cars.....	1.13	1.06
Emigrant cars.....	1.55	.94
Company's ".....	3.82	.65
Freight ".....	.84	.70
Foreign ".....	.39	.26

The latter expenses are almost entirely in gold.

From the upper table it will be seen that the average mileage of sleeping cars was 51,546 in 1870; and that of freight cars, 9,401—the former running an average of 141 miles per day, and the latter 26 miles per day.

The officers whose names are signed to different parts of the report are: Leland Stanford, President; Mark Hopkins and S. W. Sanderson, Trustees; A. N. Towne, General Superintendent; J. C. Stubbs, General Freight Agent; T. H. Goodman, General Passenger Agent; E. H. Miller, Jr., Secretary; B. Redding, Land Agent, and S. S. Montague, Chief Engineer.

THE SCRAP HEAP.

Railroad Manufactures.

The Kentucky Rolling Mill, at Louisville, Ky., makes a specialty of light rails. It is now at work on an order for Dean & Coleman's patent rail, 15 pounds to the yard, for a Southern narrow-gauge road.

The Anthracite Fuel Company, at Rondout, N. Y., is now turning out 150 tons of fuel daily and is unable to supply the demand. Most of their present supply is for railroad use. The fuel is composed of 90 per cent. coal dust and 10 per cent. of coal tar, and is pressed into blocks. This is the first successful attempt on a large scale to utilize anthracite coal dust. The company expects to enlarge its works soon.

The Chattanooga (Tenn.) Iron Company's furnace is in full blast, and the company finds a market for all its iron at \$15.50 per ton. The iron forges of George A. Kelly, seven miles from Jefferson, Tex., have been transferred to a joint-stock company which will enlarge and improve them. The works have heretofore suffered from want of transportation facilities, but are now reached by the track of the new East Line & Red River road.

The Pennsylvania Iron Works, at Danville, Pa., have started up 16 puddling furnaces and the rail mill, and expect to run all win.

The Lochiel Iron Works, at Harrisburg, Pa., shut down Oct. 21, throwing a large number of men out of work.

The Cincinnati Bridge Company has contracts for a railroad bridge 500 feet long, in three spans, over the Little Miami River for the Cincinnati & Portsmouth road, and for a highway bridge 120 feet long at Kokomo, Ind.

The street railroad engine built by the Baldwin Locomotive Works for the Baltimore City Railroad Company has been so successful that another has been ordered.

Bowers, Dure & Co., at Wilmington, Del., have a number of contracts on hand and their shops are full at work.

The car shops of the Harlan & Hollingsworth Company, at Wilmington, Del., are full of work, and the company is building several vessels in its ship-yard.

The Baltimore Bridge Company is about to begin the erection of the great bridge over the Kentucky River on the Cincinnati Southern road, which will be, we believe, the highest railroad bridge in the United States.

Prices.

Ryland's Iron Trade Circular says: "Just now iron rails can be bought for something under \$25 17s. 6d. [\$32 American currency] per ton in Middlesborough, and £5 10s. [£30 currency] in Wensley. But for Bessemer rails the price ranges from £8 0s. to £10 [£4.75 to £45.50 currency].

The prices for steel are considerably lower than here, but the highest price for steel is higher than current prices here at Eastern mills. American quotations at Eastern mills now are \$38 to \$40 for iron and \$50 to \$52 for steel, while a recent sale of steel at \$50 is chronicled, and it is said that probably this order would be duplicated for cash.

Cambria Steel Rails.</h



Published Every Friday.

CONDUCTED BY

S. WRIGHT DUNNING AND M. N. FORNEY.

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Editorial Announcements.

Passes.—All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.

Addresses.—Business letters should be addressed and drafts made payable to THE RAILROAD GAZETTE. Communications for the attention of the Editors should be addressed Editors RAILROAD GAZETTE.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN OPINIONS, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

THE AMERICAN SYSTEM OF RAILROADS.

Probably our railroad system has never before been so carefully or so generally studied by foreigners as it has been during the past summer by visitors to the Centennial Exhibition. Nearly all the engineers from abroad who have been here have given especial attention to this subject and have sought every opportunity and employed every means of making themselves acquainted with our methods, whenever they differed from those employed in Europe. These differences, it must be remembered, are not merely accidental; they are the result of a development almost entirely distinct and separate from that on the other side of the Atlantic, and, what is of much greater importance, the growth here has been under conditions quite different from those existing in Europe; and it was the necessity of fulfilling these conditions that has wrought out the differences in our practice here and that existing abroad. In Europe railroads are usually built through thickly populated sections of country, where the distances are comparatively short and where capital is much more abundant than here. In this country our roads extend through sections very thinly populated, and connect places separated by long distances and where capital is much less abundant and much more difficult to procure for such projects than in Europe. This made it necessary to build roads here at much less cost per mile than that which could be and was expended on roads in Europe. It is true that in the older countries there has been a good deal of what might be called monumental railroad building, that is, the erection of structures by engineers to show their professional skill, without much reference to the profit of the investment of the money—practice by the way not unknown here; but it is obvious that in countries with a comparatively dense population, and where roads will have a heavy traffic, a larger amount of money may be profitably expended in the construction than in a country thinly populated and where the traffic may be expected to be light for many years. The first problem, therefore, that we were called upon to solve was, how to build railroads with little money. To do this it was obviously impossible to give the same amount of permanence and stability to what in Europe is

called the "permanent way," but which term, to our credit be it said, we never until recently applied to our own road-beds. Then, too, in constructing lines through hilly and mountainous regions, as ours often were, it cost much less to build them around the hills and conform to the valleys than it would to tunnel through the one, or bridge over the other. Ours, therefore, were made with curves of shorter radius and with more and greater vertical undulations than those permitted in Europe. The problem which then presented itself to us was, how to operate such lines, that is how to run vehicles over tracks which were, either always or very often, very rough, because they were constructed with little or no ballast, and the tracks were constantly subject to disturbance by sun, rain or frost, and with very short curves and steep grades. The very first thing we were obliged to do was to construct our rolling stock to work under these conditions. This led very early to a modification of the rolling stock employed in Europe. With a rigid wheel-base, for either engines or cars, it was necessary to keep the wheels comparatively near together in order to pass around the short curves with ease. When this was done, however, the vehicle became very unsteady, owing to the roughness of the track. This led to the very general adoption of the truck under both engines and cars. With this it was possible to keep the rigid wheel-base comparatively short, which permitted the cars to pass over track on which it would have been impracticable to run the cars employed on European roads, owing to its roughness and the shortness of the curves. By carrying a car-body on two such trucks, it could be made of any desired length, and as the motion of the trucks could, to some extent, be independent of the car-body, the latter could be carried with sufficient steadiness so as not to be a serious cause of discomfort to passengers, or any injury to freight.

The arrangement of our passenger cars was also modified, owing perhaps partly to our social and political theory "that every man is as good as another," and partly to the employment of very long car-bodies. Instead of having separate apartments, which were demanded by the more exclusive habits or feelings of the older European countries, our cars were constructed with one common saloon, with an aisle affording communication all the way through. The form of the construction of the car-bodies, it is true, made it in a measure impracticable to put doors in the sides of cars, because it cut away the bracing required to give vertical stiffness to the car-body, which rested on two points near its ends. For these reasons the great majority of our cars are made with one common room, and it has been only within the last few years that any have been employed here in which the car-body is divided up into more than one apartment.

In the construction of locomotives, the truck was employed for very much the same reason that it was used with cars, that is, to make the use of a longer wheel-base possible, and thus secure greater steadiness on a rough track and also greater facility in going around curves. This increase of wheel-base has also led, during later years, to an incidental modification in our practice of locomotive construction. In Europe inside cylinder engines are still much used, and, it is claimed, are very much steadier, while running, than those with the cylinders outside the frames. In this country, until about twenty years ago, inside cylinders were also much used, but owing to the frequent breakage of the crank-shafts they fell into disfavor, and it was also found that with the long wheel-base, which was possible if a truck was used, engines with outside cylinders were steady enough for all practical purposes, and that whatever was gained in steadiness by inside cylinders was much more than offset by the first cost of crank-shafts and the subsequent expense which nearly always attended their use, owing to their liability to break. The cost of engines with outside cylinders is less, and they are much more accessible and therefore easier to repair, which recommended their adoption here.

The fact is, that the practice in this country, not only the peculiarities pointed out but in other respects besides, is better suited to a new country with a thin population than the more expensive methods employed abroad. It is not assumed that we have nothing to learn from European practice. As our population increases and with it the traffic of our roads, it will be found that we have more and more to learn from European methods. The difficulty of running a great many trains over one road has long since been encountered in Europe, but it is only quite recently that we have been led to examine into the block system and interlocking switches and signals. Their roads are adapted to doing a large traffic on a few miles of road, while ours have usually been built to do a small business on many miles of road. Our system is adapted to new countries, while theirs is intended for those with a dense population. The advantage which will result from the study of our system by foreigners will not be that it will be adopted in Europe, but that its adaptation to the conditions under which it was developed, and to which it was applied, will be seen by foreigners, and that in that way it will lead to

the introduction of American ideas, the employment of American engineers and the sale of our material, machinery and equipment to foreign countries which have heretofore procured their supplies from Europe. In this way it is believed that the Centennial will be of very material benefit to us.

It must, however, be cause of a sincere regret to most Americans who have been interested in having the railroad engineering of the country fairly represented, that some systematic effort was not made in time to induce engineers and manufacturers to make a complete exhibition of the industries connected with railroads. In some directions, it is true, the exhibition is very good. Locomotives are well represented; but the exhibition of cars, especially freight cars, is very poor. The same is true of switches, rail fastenings, water stations, and in fact everything which is made by railroad companies themselves, and is not an article of merchandise manufactured by private companies or firms. It would be for this and other more important reasons be of incalculable benefit if we could have a thoroughly systematized exhibit of our railroad industries prepared for the French Exhibition of 1878. It may perhaps seem premature to begin to talk about this before our own Exhibition is closed; but we are now nearing the end of 1876, and nearly all the preparation for 1878 must be made during the year 1877. It will be impossible to make a thoroughly systematic exhibition unless it is placed in charge of and systematized by some one head, either a committee or some other authority. For our own Exhibition the American Society of Civil Engineers undertook, at the eleventh hour, to do this kind of work, but it was too late when they began, and the work in some cases was submitted to committees who seemed to feel little or no interest in it. The first mistake could easily be avoided, if some prompt action could be taken in regard to the French Exhibition. Our experience with the Centennial ought to indicate what needs to be done for another Exhibition. Generally, the great fault was that we were behind time. When we had fairly made up our minds that there would be an exhibition and that it was desirable to be represented in it, it was too late to make the necessary preparations; and if the Centennial should be repeated, doubtless there are hundreds who would exhibit in it then whose enthusiasm could not be aroused sufficiently to induce them to incur the trouble and expense that were needed to prepare for the Exhibition this year. In fact, before it opened, there was such a want of enthusiasm and so much skepticism about its success that many did not make up their minds until the last moment that it would be desirable to be represented in it. Then, too, railroad companies have not the interest which manufacturers have to exhibit what they make and use. A manufacturer exhibits his products because he wants to make them known, or, in other words, wants to advertise them. An engineer of a railroad who makes and uses a peculiar freg or switch signal has no such motive for exhibiting it; but if solicited by a representative body, like the Society of Civil Engineers, he might from professional pride, or for the benefit to his own reputation, be induced to send a model or drawing of his peculiar device. For this reason some sort of organized appeal must be made to such persons in order to have anything like a complete exhibition of our railroad system at Paris in 1878. If this was done by competent persons who would do something more than attend committee meetings, it would, it is believed, be possible to make an exhibition in Paris which would represent very completely our system of constructing and operating railroads. The bulk and weight and consequent expense which would attend the exhibition of rolling stock makes it impracticable to have a complete representation of locomotives and cars, but these may be shown very satisfactorily by carefully made models; and if with these engravings and printed descriptions are prepared and distributed, more real information may be disseminated than is possible by exhibiting the objects themselves without such documentary material. The advantage resulting from this we have already pointed out, and it seems certain that if some accurate and comprehensive knowledge of our railroad system were disseminated all over the world, as it might be at Paris, it would attract foreign business to our own country, and open a field for American engineers in foreign countries.

NEW YORK GRAIN CARRIERS.

We have paid so much attention to the grain movement this season that doubtless some readers are tired of it, and others may think there is little left to say. Our weekly reports have given a clew to two important phenomena in this great national traffic—the extent to which the shipments from the Northwest to the seaboard have been diverted from the lake route to the railroad by the excessively low rates; and, second, the success of the rivals of New York in securing to themselves a large share of a traffic which New York had formerly has pretty much to itself. So far since navigation opened we have seen that the railroads leading from the Northwest have taken about four-ninths of the grain, which is much more than eve-

before; and that Philadelphia and Baltimore have had about three-ninths of the total receipts against New York's four-ninths—which also is without example. But the information given in these weekly reports, while showing the proportions shipped from the Northwest by rail and water does not enable us to know by what routes the grain reached the seaboard—which is a very different matter, and one most important to examine in order to understand the effect of the low rail rates on the seaboard receipts; for, apparently, the low rates were not intended primarily to take traffic from the lakes, but to affect the distribution of the grain at the different ports. The grain shipped by lake does not all go through by water; propellers connect with different railroads which carry to the leading seaports, and at Buffalo two railroads compete directly with the canal for the cargoes arriving. While from the opening of navigation till the end of September about 49,000,000 bushels were shipped by lake from the Northwest, only about 29,000,000 arrived at the seaboard by water from the lakes, and the rail receipts at the seaboard exceeded by 16,000,000 the total rail shipments from the Northwest, and it is well known that the home consumption in the East is, and for some years has been, chiefly supplied by rail.

The facts which enable us to make this examination are contained in the reports of the receipts of grain at New York by the different routes as made by the New York Produce Exchange.

The receipts of grain at New York for the nine months ending with September have been, by each route, for three years, in bushels:

By Railroads:	1876.	1875.	1874.
Pennsylvania.....	2,308,164	3,218,922	6,038,970
New York Central & Hudson			
River.....	12,208,154	13,187,312	13,981,946
Erie.....	10,219,080	11,586,177	13,144,030
Other roads.....	204,775	218,061	260,822
Total by rail.....	25,076,496	27,210,472	33,425,768
By Water:			
Vessels coastwise.....	1,737,908	498,762	426,096
North River from N. Y. Central			
at Athens.....	5,101,940	2,571,480	
Other North River boats.....	19,394,648	20,439,981	32,765,832
Total by water.....	26,234,496	20,938,743	33,191,928
Total by rail and water.....	51,310,992	48,149,215	66,616,696

The percentage received by each route each year was:

Railroads:	1876.	1875.	1874.
Pennsylvania.....	4.5	6.7	9.1
New York Central & Hudson			
River.....	24.0	25.3	21.0
Erie.....	20.0	24.1	19.7
Other roads.....	0.4	0.5	0.4
Total by rail.....	48.9	56.6	50.2
Vessels coastwise.....	3.4	1.0	0.6
North River from N. Y. Central			
at Athens.....	10.0	...	...
Other North River boats.....	37.7	42.5	49.2
Total by water.....	51.1	43.5	49.8

Heretofore (July 28, page 330) we have given a table similar to the above for the six months ending with July. Then for the current year the rail receipts had been about 60 per cent. of the total. Since that time, as was to be expected, the proportion of water receipts has greatly increased, and the proportion received by each railroad has decreased. Compared with the previous years, the receipts of the Pennsylvania Railroad show the greatest decrease, but the decrease in rail receipts is general, though the grain traffic of the season has never been exceeded, or never but once. Counting the receipts from the New York Central by boats from Athens, this is not true in comparison with last year, but, as we shall see further on, even then the rail receipts are less than in 1874.

Tracing the movement month by month we find the arrivals of the year to have been divided between the rail and water routes as follows:

	1876.	1875.	1874.
January....	3,334,350	2,705,786	4,407,375
Rail.....	401,784	36,275	147,744
Water.....	2,932,566	2,669,511	4,260,631
February....	2,244,106	3,638,303	5,031,073
Rail.....	259,814	193,462	194,718
Water.....	1,984,292	4,444,841	4,836,300
March....	2,930,846	2,048,810	2,823,306
Rail.....	420,117	141,369	61,500
Water.....	2,374,614	2,877,108	2,745,238
April.....	832,579	51,103	121,143
Rail.....	4,249,418	3,776,398	4,413,088
Water.....	5,578,238	210,153	5,344,044
May.....	3,891,897	2,826,031	3,816,306
Rail.....	5,247,112	5,116,944	7,635,223
Water.....	2,388,133	2,813,476	3,024,757
June.....	6,160,699	3,988,126	7,775,101
Rail.....	1,371,644	2,965,040	2,199,220
Water.....	3,018,084	5,960,750	5,458,437
July.....	2,391,488	3,069,820	1,961,406
Rail.....	4,316,071	5,240,571	6,452,018
August....	26,324,496	20,938,743	33,191,928
September....	26,234,496	20,938,743	33,191,928
Nine mos....	51,310,992	48,149,215	66,616,696

Thus for the nine months New York received by rail 48.87 per cent. of its total grain receipts this year, against 56.50 per cent. last year, and 50.17 per cent. in 1875. In amount the rail receipts were this year 25 per cent. less than in 1874 and about 8 per cent. less than in 1875. Water receipts meanwhile have this year been 23 per cent. less than in 1874 and 25 more than in 1875. That is, there has been a greater falling off in rail receipts than in water receipts at New York.

As the New York Central & Hudson River has this year sent a very large proportion of its grain down the Hudson from Athens, about a hundred miles, the water receipts a

New York are increased largely by a business which a New York railroad secures and carries most of the way from the lakes. If we transfer these receipts via Athens from the water to the rail receipts, we shall have as the totals for the nine months:

	1876.	1875.	1874.
Rail receipts.....	30,178,436	27,210,472	33,425,668
Water receipts.....	21,132,556	20,938,743	33,191,928

This would make the rail receipts this year 58.83 per cent. of the total, against 56.50 in 1875 and 50.17 in 1874—the increase over last year being very small.

Now while the New York receipts for the nine months have increased 6½ per cent., the total receipts at Atlantic ports have increased nearly 22 per cent., and we have:

	1876.	1875.	Increase. P.c.
Receipts at New York.....	51,310,992	48,149,215	3,161,777 6.6
Other Atlantic ports' receipts.....	69,398,127	50,900,997	18,492,130 36.3

Thus of the total increase in receipts this year New York has secured but one-seventh: the business has been diverted to other ports, and chiefly to Philadelphia and Baltimore.

During the midsummer quarter—the three months since July—the rail receipts at New York have been less than at either Philadelphia or Baltimore, the figures being:

	1876.	1875.	1874.
Philadelphia.....	7,781,050	—	—
Baltimore.....	6,405,600	—	—
New York.....	6,051,265	—	—

If, however, we include the receipts by way of Athens with the rail receipts, New York leads with 8,608,705 bushels.

Considering, however, that New York is a main terminus of three trunk railroads, and that two of the three carry for export to New York almost exclusively, the result is decidedly favorable to the more southern cities.

Two railroads carry to New York in three months 8,016,000 bushels.

Two other railroads carry to Baltimore and Philadelphia 14,186,050 bushels.

If we are to look for the effect of the low rail rates on the distribution of receipts at the different ports, we must separate the receipts before these rates were made (about April 22) from those after that date, as we did in the article published July 28.

Now, since that date of the opening of navigation, and the great reduction in rail rates, the receipts of grain at all Atlantic ports have been, assuming all those at Montreal and New Orleans to have been by water:

By rail.....	50,864,159 bushels.
By water.....	36,926,568 "

Meanwhile the receipts at New York were:

By rail.....	15,051,640 bushels.
By water.....	24,487,701 "

This shows how completely New York's supremacy in the grain traffic has depended upon the water route. Of the entire rail receipts at the seaboard, less than 30 per cent. was at New York, while Philadelphia secured 32 per cent. and Baltimore 25½ per cent. The fact that New York in that time obtained 44 per cent. of the total sea-board receipts was due to the immense contribution by boats, which have brought to New York since the opening of navigation nearly half as much as the railroads have brought to all the ports put together. But for the canal, Philadelphia this season would now appear to be the leading grain receiver. The appearance would be a little misleading, for, as we have said before, of the water receipts at New York this year, more than five million bushels were delivered in barges by the New York Central & Hudson River Railroad, which finds it more convenient and economical to send the grain the last hundred miles in this way, inasmuch as nearly all of it has to be delivered at last on the water, and the transfer to vessel would have to be made in New York harbor if not at Athens. But counting this with railroad receipts, we have since the opening of navigation a total of about 56,000,000 bushels delivered by rail at the sea-board, of which 20,000,000, or 36 per cent., went to New York, a little more than half of its total receipts and about a quarter more than the Philadelphia receipts, which latter are virtually by a single railroad.

Returning to the effect of the low rates on the distribution of grain, we will compare the proportion of the total seaboard rail receipts received at New York before and after the reduction. We find these proportions to have been:

32.61 per cent. before April 22, and	36.01 " since April 22.
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The struggle for business under the low rates, then, has resulted in New York's getting a somewhat larger proportion of the rail receipts than during the winter and spring, when New York merchants (justly, too,) became alarmed, and complained that Philadelphia and Baltimore were destroying their grain business. The winter diversion was made at rates varying from 45 to 50 cents per hundred from Chicago; the fact that the other ports have still secured 64 per cent. of the rail grain receipts at the seaboard while rates have been nominally 20 cents per hundred and have actually been less on probably the largest part of the traffic, fully justifies the conclusion that New York suffers by low rail rates. Its supremacy is due to the fact that it has had the cheapest route from the interior. As soon as rail rates become as low as water rates, this cause of supremacy ceases. All the ports have railroads: only New York has a canal.

Foreign Railroad Notes.

M. Hippolyte Fontaine, continuing his articles on the Centennial Exhibition in the *Revue Industrielle*, gives his impressions of American locomotive works, acquired chiefly at the Baldwin Works. He says: "As I had had occasion to visit the principal locomotive works in Europe, I was able to compare the means of production of the New and the Old World, and what struck me most in the American works, and especially at Baldwin's, was the small space and the few tools and workmen required by the immense actual production. I do not speak, be it understood, of the present year, when work is so restricted; I mean the possible, normal, regular production. On an average, I knew that 6 machine tools, 20 workmen and 2,100 square feet of surface under cover were required for every locomotive turned out yearly; and if I had been consulted as to the establishment of a shop capable of producing 100 locomotives yearly, I would have answered that it was necessary to provide 210,000 square feet of building under roof, 600 machine tools, and 2,000 workmen. My calculations would have been found erroneous in America; for in the Baldwin Works 500 locomotives can be manufactured yearly with 3,000 workmen and 650 machine tools. The surface under cover is 265,000 square feet, to which it is proper to add 64,000 to 75,000 square feet for upper stories. There is then altogether 340,000 square feet of floor space. This gives 685 square feet under cover, 6 workmen and a little more than one machine tool per locomotive turned out yearly.

"The Fives-Lille shops may be compared to the Baldwin Works so far as number of workmen, number of machine tools and amount of business are concerned; although at Fives-Lille it is not exclusively locomotives and tenders that are manufactured. Now the Fives shops occupy 586,000 square feet under cover, and 480,000 of yards, while the Baldwin Works have only 265,000 square feet under cover and 117,000 of yards."

Mr. Fontaine gives as at least a partial explanation of these extraordinary differences the following: 1. Usually American locomotives are not so heavy and have less work on them than European engines. 2. The fitting is generally less exact and finished in America. (He excepts those exhibited at Philadelphia). 3. The work of machine tools is better understood in America; that is, a part is fashioned completely without requiring removal as often as in Europe; and a great many details, in Europe made by hand, are done by machinery in America. 4. In America several hundreds of engines are made after the same model, which never occurs in Europe.

In consequence of a recent order of the Eastern Railroad of France prohibiting the running over its lines of foreign cars with either cast-steel disc wheels, chilled cast-iron wheels, or wheels with wrought-iron discs, Mr. C. Hornbostel, Director of Workshops and Train Dispatching on the Empress Elizabeth Railroad of Austria, writes that chilled cast-iron wheels have been used for 18 years on roads of standard gauge in Austria and Hungary, and at this time there are 140,000 such wheels running in those countries under 35,000 freight cars, while the whole number of freight cars is 75,000. The regulations of the German Railroad Union, fixing the requirements of cars which may pass over all the roads in the Union, are in many respects severe; they are carefully prepared, and are subject to frequent revision; but under all revisions chilled cast-iron wheels have been admitted. As evidence of the safety and durability of such wheels, Mr. Hornbostel adduces the fact that the Empress Elizabeth road has had them in use for 16 years, and has now 1,500 freight cars with them out of a total car stock of 5,200. The average life of a wheel is about seven years. As regards safety, he says that in the past two years, out of the stock of 6,000 wheels running on the road, not a single one has broken, though both winters were unusually severe and long. Meanwhile, a considerable number of tires broke on other car wheels. The matter, of course, is of considerable importance to the roads having such wheels, as their cars are often loaded for France and other countries.

A special school of training for postal, railroad and telegraph service was established in Prague, in 1872, at the instance of Dr. Banhans, who was then Minister of Commerce. It has developed greatly since, and is said to have already supplied a considerable number of well prepared employees to the State and the railroads. The railroad companies which have their headquarters in Bohemia interest themselves in the railroad course of preparation, and through one of their managers exert some influence on it.

The French railroads during the first half of 1876 had an average extent of 12,376 miles, against 11,954 miles in the first half of 1875. The total earnings of these roads were \$80,349,768 this year and \$79,909,344 last, and the average earnings per day were \$35.74 this year and about a dollar more last year. This is equivalent to average earnings of \$6,505 per mile for the six months. During the year ending with June last 450 miles of new railroad were opened for traffic in the country.

One of the Austrian railroads has constructed two branches of its main line in Hungary as "secondary" or light, cheap roads, of the standard gauge. The country through which they pass seems to be something like the Northwestern prairies—favorable for grain-growing, quite level, but with horrible roads. The cost of hauling over these roads was usually at the rate of 14½ to 17½ cents per mile per ton of 2,000 lbs., so that at a distance of 33½ miles from the railroad station where shipped the value of grain was reduced 14½ to 17½ cents a bushel by the cost of transportation. One of these lines, from Valkany to Pergamos, 27 miles, was constructed in the year 1870. The road-bed was made 13 ft. wide, the ballast 9 ft. wide and 10 in. deep, the ties 7 ft. 9 in. long, rails weighing 50 lbs. per yard (against 74 lbs. on the main line)—that is, it was made very light according to European standards. The cost with three locomotives was \$20,250 per mile—less than one-third of the usual cost of railroads in that country.

A second branch about 30 miles long, from Vojteck to Bogdan, was opened for traffic in September, 1874. It was constructed in a similar manner, but over somewhat more difficult ground, and cost \$21,350 per mile.

These would not be cheap railroads in this country, and there is no doubt that in many places light roads can be built here to be worked at low speeds with light engines, but abundantly able to take the standard cars and loads of their connections, for half these prices.

At the International Statistical Congress in Buda-Pesth, recently, a report was made on the subject of general international railroad statistics. Such statistics, it was held, should include at least these four divisions: 1, financial statistics; 2, technical; 3, operating and commercial, and, 4, accident statistics. The Congress was unable to come to a conclusion on the subject, which appeared to it so important that it was made the topic for the next International Congress, and a committee of fifteen, with power to add to its numbers, was appointed to investigate the subject and report. The head of the committee is Councillor Brachelli, of the Austrian Department of Commerce, and most of the members are official statisticians of different countries and railroad officers.

There was recently a case tried in Bohemia in which a railroad company was asked to make good shortages in coal carried by it. The company maintained that there was an absolute loss, amounting to as much as 2 per cent. on the average, by the exposure of coal to the air, however well constructed the cars might be, and this fact was established by evidence, which was to the effect that coal exposed to the air lost in weight in proportion to the fineness of the coal and the length of time it was exposed.

The Northern Railroad of France has been experimenting for several months with an electric brake apparatus, invented by a M. Achard, and also with Smith's vacuum brake.

The Grain Movement for Twenty-six Weeks.

The shipments of grain of all kinds from the eight principal Northwestern markets for each week since April 22 have been, in bushels, by lake and by rail:

Week ending—	By lake.	By rail.	Total.	Per cent. by rail.
April 29	1,834,641	2,072,946	3,707,487	56
May 6	2,445,191	2,292,638	4,737,829	48 1/2
13	1,538,626	2,302,940	3,841,466	60
20	1,692,170	2,016,304	3,618,474	58 1/2
27	1,747,408	1,820,456	3,567,864	51
June 3	2,412,162	1,797,923	4,210,084	42 1/2
10	2,804,915	2,147,670	4,942,585	42 1/2
17	2,921,405	2,691,811	5,313,216	46
24	2,726,706	2,108,061	4,926,760	44 1/2
July 1	1,821,155	1,784,548	3,605,703	49 1/2
8	1,765,010	1,205,184	2,970,194	40 1/2
15	1,648,508	1,228,678	2,877,186	42 1/2
22	2,269,336	1,032,825	3,302,161	31 1/2
29	1,466,502	1,038,208	2,504,710	41 1/2
Aug. 5	2,055,243	1,285,268	3,338,511	38 1/2
12	1,744,059	1,300,720	3,044,779	42 1/2
19	2,160,202	1,614,256	3,764,548	42 1/2
26	2,382,152	1,620,811	3,872,963	39 1/2
Sept. 2	1,698,491	1,673,058	3,271,549	46 1/2
9	2,374,473	1,818,411	4,192,884	43 1/2
16	2,968,634	1,688,318	4,651,952	36 1/2
23	2,268,894	1,820,361	4,069,255	44 1/2
30	2,427,357	1,797,847	4,225,204	42 1/2
Oct. 7	3,009,394	1,650,888	4,660,252	35 1/2
14	2,630,729	1,835,991	4,366,720	42
21	2,673,647	1,800,837	4,474,484	40 1/2
Total for 26 weeks....	57,143,900	45,034,915	102,178,815	44

The total shipments are just above the average of the weeks since August, and so are the rail shipments, which do not increase, notwithstanding the rise in lake and canal rates. Wheat formed 34 per cent. of the total shipments and corn 46 per cent.

For the same 26 weeks the receipts at the different Atlantic ports have been:

	Per cent. of corn.	Per cent. of total.	All grains, per cent. of total.	
New York	17,877,229	34.0	45,186,185	46.6
Boston	5,444,083	10.4	7,692,250	7.8
Portland	469,000	0.9	822,170	0.8
Montreal	3,260,085	6.3	10,606,693	10.7
Philadelphia	12,225,550	25.5	18,165,400	18.3
Baltimore	11,394,300	21.6	14,127,985	14.3
New Orleans	1,756,083	3.4	2,451,281	2.6
Total.	62,458,270	100.0	90,059,973	100.0

New York continues to receive a much larger proportion of the grain than in the summer and spring, and within the last week reported advanced its rank materially in receipts of corn and of all grains. In corn receipts Philadelphia lost most, Baltimore nearly as much, and Boston also took a short step downward. In receipts of all grains, the losses of Philadelphia and Baltimore were less.

This completes a half-year's business, amounting to about a hundred million bushels, nearly one-third of which—a very much larger proportion than ever before—has been done by Philadelphia and Baltimore.

Record of New Railroad Construction.

This number of the *Railroad Gazette* has information of the laying of track on new railroads as follows:

New Brunswick.—The Aroostook Branch is extended from Fort Fairfield, Me., west by north to Caribou, 12 miles. It is of 3 ft. 6 in. gauge.

Elmira & State Line.—Extended west by south 10 1/4 miles to Lawrenceville, Pa., completing the road.

Cincinnati Southern.—There have been 30 miles of track laid in addition to that already reported.

Dayton & Southeastern.—Extended from Jamestown, O., to Washington Court House by laying 14 1/2 miles of track. It is of 3 ft. 6 in. gauge.

Indianapolis, Cincinnati & Lafayette.—Early in the year a branch was built from Greensburg, Ind., south to stone quarries, 5 1/2 miles.

Chicago & Lake Huron.—Extended from Flint, Mich., east by south to Shiawassee, 20 miles.

East Line & Red River.—Extended 5 miles to a point 15 miles west of Jefferson, Tex.

North Pacific Coast.—Extended from Freestone, Cal., north to Heward, 7 miles. It is of 3 ft. gauge.

This is a total of 105 miles of new railroad, making 1,875 miles completed in the United States in 1876, against 986 miles reported for the corresponding period in 1875, 1,363 in 1874, 3,075 in 1873, and 5,709 in 1872.

Railroad Embezzlements.

A letter to the Chicago *Railway Review* gives as an illustration of conductors' embezzlements the following table of cash collections on the trains of the Pacific Railroad of Missouri. Conductors on that road having been suspected, detectives were put on the trains. The result of their observations so confirmed the suspicions that the old conductors were discharged July 10, so the returns for May and June show the collections by the old conductors, those for July 10 days' collections by old and 21 by new conductors; and August collections were wholly by new conductors:

No. of train.	May.	June.	July.	August.
No. 1.	\$166 45	\$166 40	\$485 30	\$832 00
No. 2.	204 15	270 25	454 90	873 30
No. 3.	206 95	174 25	444 45	654 05
No. 4.	245 95	287 50	581 30	951 50
No. 1, Second Section.	41 00	29 70	97 35	147 00
No. 2	24 05	18 70	62 25	140 60
No. 3	45 95	73 20	179 70	247 00
No. 4	83 55	78 45	166 40	228 90
Kirkwood Accommodat'n	27 05	28 65	46 20	101 40
Washington	32 55	31 95	86 80	123 30
Lexington Branch, 43 and 44.	148 80	173 20	259 60	191 70
Lexington Branch, 45 and 46.	93 80	114 75	149 75	312 55
Boonville Branch.	73 80	64 35	110 50	237 00
No. 35 and 44.	104 70	108 70	275 00	286 70
Total.	\$1,598 75	\$1,620 05	\$3,338 00	\$5,327 15
Average per day.	\$51 60	\$4 00	107 00	171 84

The only comment necessary is that railroad companies, besides setting business and earning a revenue therefrom, need to adopt an efficient system for collecting their revenue, which necessitates men as well as methods specially fitted for the business. It will not do to depend upon the character of employees; where there are unusual chances for peculation men who will take advantage of them are attracted and will sooner or later succeed in getting some of the places. The system should be such as will keep a constant check on the men (not conductors alone, by any means) who first receive the money; and not depend upon spasmodic efforts at detection after suspicion has been aroused, and after scores of thousands of dollars have been lost, probably. The art of collecting and disbursing the revenues of a great corporation is not the least important and one of the most delicate committed to its officers. It needs studying.

THE BROTHERHOOD OF LOCOMOTIVE ENGINEERS has done itself credit by offering the very liberal reward of \$5,000 for the discovery and arrest of the person or persons who misplaced the switch on the Central Railroad of New Jersey during the recent strike, by which a train was wrecked and two men killed. The act is charged to the strikers, and probably enough one of the strikers was guilty of it, but in all such cases, be the strike justifiable or unjustifiable, there may be some lawless men, whose viciousness is encouraged by the general feeling towards the employer; and such men are always likely at such a time to vent their rage in a manner which few or none of their associates in the strike would ever imitate or justify. But the other strikers always are charged with the guilt of any of their number, or of any one else who may take advantage of the occasion to give play to his malice; for the community recognizes that the strike probably gave opportunity for committing the crime, and does not stop to consider that almost every movement which brings men's passions to great heat gives similar occasion, though the object aimed at be ever so praiseworthy. So it is peculiarly appropriate that a body of strikers should not only proceed peaceably and discreetly in their authorized measures, but make special effort to detect and bring to punishment those who, though unauthorized, may have done violence for the cause which the strikers have at heart. Nothing will so soon and so completely destroy the power of an organization of workingmen as a general conviction in the community that it has used or countenanced violence in its efforts to attain its ends; and such a conviction is likely to prevail if the organization is passive when violence has been done. An offer of \$5,000 is one pretty good evidence that the Brotherhood as a whole does not countenance crime: a better one will be if the members of the Brotherhood bring the criminal to punishment.

TRAUNK LINE CONFERENCE was held in New York Tuesday and Wednesday of this week, the second day's session closing just as we go to press. The result, as we write, has not been announced, which makes it probable that a result had not then been reached, and also that a satisfactory agreement had not been found impossible. This is the first meeting since the break of rates in April at which all the trunk lines have been represented by their executives, and it will be not at all strange if before this reaches our readers an agreement shall have been effected and rates advanced. There is the more hope because the meeting has been prolonged. No satisfactory adjustment can be arrived at until a basis is agreed upon; and this is not to be done wisely by inspiration, or without much negotiation. The latest report of the meeting is that, while no conclusion was arrived at, it adjourned to meet at the call of the Chairman, Mr. Jewett, of the Erie, which does not look as if a settlement were hopeless. It is desirable that when peace is made it be made in such a way that it will at least be possible for it to be lasting.

MR. WELLINGTON'S TREATISE on the "Justifiable Expenditure for Improvement in the Alignment of Railways" will be completed in a few more numbers, beginning probably next week. The continuation of it in time for the publication of instalments in the last and the current number has been unavoidably delayed.

General Railroad News.

ELECTIONS AND APPOINTMENTS.

Great Western, of Canada.—At the semi-annual meeting in London, England, Oct. 12, Right Hon. Hugh C. E. Childers, Col. F. D. Gray and Mr. J. W. MacLure, were re-elected directors. Messrs. John Young and Thomas Adams were re-elected auditors.

Wisconsin Central.—Mr. H. M. Riddell has been appointed Acting General Freight Agent, in place of J. E. Follett, resigned.

Western Maryland.—The new board has re-elected J. M. Hood President and General Manager; Alexander Kiernan, Vice-President; John S. Harden, Secretary and Treasurer.

People's Railroad & Ferry.—The first board of directors of this new company is as follows: F. Boehmer, W. W. Lawton, Conrad Liese, Carl Petersen, C. M. Badolf, E. M. Smith, George O. Smith, Jr. The office is at Alameda, Cal.

Credit Valley.—Mr. Henry E. Suckling has been appointed Secretary in place of J. G. Conlin.

Elmira State Line.—The directors of this company are as follows: Dr. Edwin Eldridge, R. W. Rathbone, H. D. V. Pratt, H. H. Cook, S. T. Arnot, John Arnott, A. S. Diven, F. G. Hall, M. P. Bush, F. N. Drake, S. T. Reynolds, D. S. Drake, George M. Diven. The officers are: President, F. N. Drake; Vice-President, S. T. Reynolds; Secretary, D. S. Drake; Treasurer, George M. Diven; Chief Engineer, S. M. Seymour; Assistant Engineers, James W. Morris, Fred. Leach, Jr.

Central Branch, Union Pacific.—At the annual meeting in Atchison, Kan., Oct. 18, the following directors were chosen: Thomas Murphy, W. F. Downs, Atchison, Kan.; S. C. Pomeroy, Muscatine, Kan.; James Potter, Bridgeport, Conn.; R. M. Pomeroy, Boston; W. C. Wetmore, Clement S. Barnes, Alfred S. Barnes, Henry Day, Samuel S. Rowland, A. W. Greenleaf, Oliver H. Palmer, E. Nichols, New York.

Ohio Falls & Northwestern.—The first board of directors of this new company is as follows: Wm. H. Irwin, Wm. F. Reid, Oliver H. Stratton, W. H. Ongley, E. Kampfmiller, Alvin J. Stock, Frank E. Clarkson, Alexander Worrell, J. W. Robbinette, Enoch Lockhart, Neville C. Wilson, David J. Conger, Samuel Cleaver.

Railroad Conductors Life Insurance Association.—At the annual convention in Detroit, Oct. 27, the following officers were chosen: President, M. D. Waters, New York; Central & Hudson River; First Vice-President, M. Spain Jay, Memphis & Little Rock; Second Vice-President, Harry M. Mounts, Jeffersonville, Madison & Indianapolis; Secretary and Treasurer, Joseph F. Culbertson, Columbus, O.; Executive Committee, J. W. Moore, R. J. Swively, O. W. Merrill.

Union Railway & Transit Company of St. Louis.—Mr. R. H. Shoemaker has been appointed Assistant President. He has been for some time Superintendent of the Cincinnati Division, Cleveland, Columbus, Cincinnati & Indianapolis road.

Danbury & Norwalk.—At the annual meeting in Norwalk, Conn., Oct. 26, the following directors were chosen: Edgar S. Tweedy, Lucius P. Hoyt, David P. Nichols, Danbury, Conn.; Orrin Benedict, Bethel, Conn.; James W. Hyatt, Wm. K. James, Wm. C. Street, Norwalk, Conn.; Ambrose S. Hurlbut, Westport, Conn.; Henry H. Hollister, Roswell P. Flower, New York. The board elected R. P. Flower, President; James W. Hyatt, Vice-President; Harvey Williams, Secretary and Treasurer; John W. Bacon, Superintendent.

Grand Junction.—At the annual meeting in Hastings, Ont., Oct. 16, the following officers were chosen: President, Thomas Kelso; Vice-Presidents, R. Read, Dr. Boulter; Secretary, D. B. Robertson; Treasurer, U. E. Thompson.

Camden & Atlantic.—At the annual meeting in Camden, N. J., Oct. 26, the following directors were chosen: John Lucas, Andrew K. Hay, James B. Dayton, Enoch A. Doughty, Thomas H. Dudley, Samuel C. Cooper, George T. Da Costa, William C. Allison, Charles D. Freeman, John F. Starr, Joshua R. Jones, William C. Houston, John A. Merritt. The last five in the list are new directors, replacing Messrs. A. J. Antelo, W. D. Bell, Wm. Massey, C. B. Colwell and Samuel Richards. The board re-elected John Lucas President; D. M. Zimmerman, Secretary and Treasurer.

Cairo & St. Louis.—Mr. J. L. Hinckley, General Superintendent, having resigned, Mr. F. E. Canda, President and General Manager, is acting as Superintendent. Mr. Michael English has been appointed Roadmaster, in place of Mr. Bolton resigned.

PERSONAL.

Mr. Thaddeus C. Pound, President of the Chippewa Falls & Western Company and a large lumber manufacturer, is Republican candidate for Congress from the Eighth Wisconsin District.

Bankruptcy proceedings have been begun against Mr. Edward Matthews, of New York, who is the principal, almost the sole, owner of the Carolina Central Railroad. Mr. Matthews is a very large owner of real estate in New York and has been considered a very wealthy man. His property is probably worth very much more than his liabilities, but he appears to have been embarrassed by his railroad and building operations.

Hon. A. B. Foster has resigned his position as Managing Director of the Canada Central and Brockville & Ottawa railroads.

Mr. G. W. Beach, Superintendent of the Naugatuck Railroad, was presented with a handsome gold-headed ebony cane, on behalf of a number of friends, at Waterbury, Conn., Oct. 21.

The Republicans of Hunterdon County, N. J., have nominated for the State Senate Mr. Lewis H. Taylor, of High Bridge, who is a director of the Delaware & Bound Brook Railroad Company and was Superintendent of Construction while the road was being built.

In the United States Circuit Court at Dubuque, Ia., last week the government obtained a judgment for \$110,000 against the sureties of J. A. Rhomberg, a large distiller of Dubuque, who is also President of the Chicago, Dubuque & Minnesota and the Chicago, Clinton & Dubuque companies.

Hon. Morris Tyler, formerly Lieutenant Governor of Connecticut, a director and one of the principal owners of the New Haven & Derby road, died in New Haven, Conn., Oct. 31

for corn. Meanwhile canal rates have been materially higher, reported most of the week at 10 cents for wheat, 9½ for corn and 7 for oats from Buffalo to New York. To send wheat by lake and canal from Chicago to New York now costs about 15 cents a bushel. Meanwhile quotations for "lake and rail" (proprietor to Buffalo and rail thence to New York) are 14 cents for wheat and 13 for corn; and still the rail rate is 12 cents for wheat and 11½ for corn, but there is complaint of lack of cars, and reports of premiums offered for early shipments.

Ocean rates have fluctuated within narrow limits, closing Tuesday at 9½ d. for grain by sail from New York to Cork for orders, 7½ d. by sail and 7½ d. by steam to Liverpool; petroleum to Cork for orders 5s. per barrel; and by steam from New York to Liverpool, bacon 35s. per ton, butter and cheese 45s.

Coal Movement.

Coal tonnages for the week ending Oct. 21 are reported as follows:

	1876.	1875.	Inc. or Dec.	P. c.
Anthracite.....	563,998	572,489	Dec.	9,501 1.7
semi-bituminous.....	72,737	78,450	Inc.	5,718 7.3
Bituminous, Pennsylvania.....	46,977	42,005	Inc.	4,972 11.8

The Delaware, Lackawanna & Western monthly auction sale took place Oct. 25, and there was a slight decline of prices except for chestnut size, for which there appears to be an increasing demand, that size growing in favor for domestic use.

Railroad Earnings.

Earnings for various periods are reported as follows:

Year ending June 30:

	1875-76.	1874-75.	Inc. or Dec.	P. c.
Cincinnati, Sandusky & Cleveland.....	\$791,891	\$787,671	Inc.	\$4,220 0.5
Expenses.....	576,908	561,776	Inc.	15,132 2.7
Net earnings.....	\$214,983	\$225,995	Dec.	\$10,912 4.8
Earn. per mile.....	4,162	4,140	Inc.	22 0.5
Per cent. of exps.....	72.85	71.32	Inc.	1.53 2.1
Nine months ending Sept. 30:				
	1876.	1875.	Inc. or Dec.	P. c.
Cleveland, Mt. Vernon & Delaware.....	\$280,801	\$315,026	Dec.	\$34,825 11.0
Kansas Pacific.....	2,154,821	2,416,084	Dec.	261,233 10.8
Philadelphia & Erie.....	2,409,563	2,462,084	Dec.	53,121 2.2
Expenses.....	1,680,789	1,687,315	Dec.	6,526 0.4

	1876.	1875.	Inc. or Dec.	P. c.
Net earnings.....	\$728,774	\$775,360	Dec.	\$46,595 6.0
Per cent. of exps.....	69.75	68.51	Inc.	1.24 1.8
Month of July:				
Atlantic, Miss. & Ohio.....	\$120,448	\$119,778	Inc.	\$670 0.6
Expenses.....	76,209	80,700	Dec.	4,491 5.5

	1876.	1875.	Inc. or Dec.	P. c.
Net earnings.....	\$44,230	\$39,078	Inc.	\$5,161 13.2
Per cent. of exps.....	63.51	67.36	Dec.	3.85 5.7
Month of August:				
Atlantic, Miss. & Ohio.....	\$152,982	\$140,224	Inc.	\$12,758 9.1
Denver & Rio Gr'de, Main Line.....	33,322	32,760	Dec.	562 1.7
Expenses.....	20,829	19,134	Inc.	1,695 8.7

	1876.	1875.	Inc. or Dec.	P. c.
Net earnings.....	\$12,493	\$18,626	Dec.	\$1,133 8.3
Per cent. of exps.....	62.51	62.21	Inc.	0.30 0.5
Month of September:				
Boston, C'ton, Fitchburg & N. Bedford.....	\$110,483	\$108,006	Inc.	\$2,477 2.3
Expenses.....	52,741	.....	.....	.....

	1876.	1875.	Inc. or Dec.	P. c.
Net earnings.....	\$50,742	.....	.....	.....
Per cent. of exps.....	54.96	.....	.....	.....
Cleveland, Mt. Vernon & Delaware.....	235,518	\$40,459	Dec.	\$4,941 12.2
Kansas Pacific.....	301,959	315,641	Dec.	13,692 4.3
Philadelphia & Erie.....	319,722	344,047	Dec.	24,325 7.1
Expenses.....	156,167	195,997	Dec.	37,730 19.3

	1876.	1875.	Inc. or Dec.	P. c.
Net earnings.....	\$161,555	\$148,150	Inc.	\$13,405 9.0
Per cent. of exps.....	49.47	56.94	Dec.	7.47 13.1
Second week in October:				
Denver & Rio Gr'de, Main Line.....	\$7,980	\$7,134	Inc.	\$846 11.9
Denver & Rio Gr'de, Trinidad Extension.....	3,244	.....	.....	.....
St. Louis, Iron Mt. & Southern.....	124,243	106,422	Inc.	17,821 16.7

	1876.	1875.	Inc. or Dec.	P. c.
Net earnings.....	\$50,742	.....	.....	.....
Per cent. of exps.....	54.96	.....	.....	.....
Week ending Oct. 6:				
Great Western, of Canada.....	\$20,240	\$19,049	Inc.	\$1,191 6.3
Week ending Oct. 7:				
Grand Trunk.....	\$26,000	\$24,300	Dec.	\$2,700 8.5

Grain Movement.

Receipts and shipments for the week ending Oct. 21 were, in bushels:

	1876.	1875.	Inc. or Dec.	P. c.
Lake ports' receipts.....	5,352,363	5,065,246	Inc.	287,117 5.7
" shipments.....	4,474,484	4,153,903	Inc.	320,681 7.8
Atlantic ports' receipts.....	4,059,398	4,171,904	Dec.	57,906 1.4

Of the shipments from lake ports, 40% per cent. was by rail this year, against 26% per cent. in 1875 and 16% per cent. in 1874.

Chicago receipts and shipments for the week ending Oct. 28 were:

	1876.	1875.	Inc. or Dec.	P. c.
Receipts.....	2,073,664	2,362,624	Dec.	298,940 12.2
Shipments.....	2,254,726	1,541,436	Inc.	713,291 46.3

Buffalo grain and flour receipts for the ten months ending Oct. 31 were as follows, flour in barrels and grain in bushels:

	Flour.	Grain.
By lake.....	687,820	854,542
By rail.....	968,500	522,700

Total..... 1,604,320 1,377,242

50,337,355 50,894,357

The ten months show an increase of 227,078 barrels, or 16.5 per cent., in flour, and a decrease of 557,004 bushels, or 1.1 per cent. in grain. Of the flour this year 60.2 per cent., and of the grain 23.3 per cent. came by rail, showing a large relative increase in the rail movement. For the same period shipments eastward were as follows:

	1876.	1875.	Decrease.	P. c.
By rail, bushels.....	11,64,927	12,062,092	917,165	7.6
By canal.....	24,478,499	30,193,370	5,715,881	18.9

Total..... 35,643,416 42,275,902

6,632,486 15.7

The rail shipments were 31.3 per cent. of the whole in 1876 and 26.6 per cent. in 1875. The canal opened May 4 in 1876, and May 18 in 1875.

Eric Canal Tolls.

The business of the canal at Buffalo for the period from the opening of navigation up to Oct. 31 was as follows:

	1876.	1875.	Decrease.	P. c.
Tolls received.....	\$519,997 28	\$683,887 08	\$169,889 80	24.8
Boats cleared.....	4,202	5,628	1,924	24.1

The canal opened May 4 in 1875 and May 18 in 1876.

THE SCRAP HEAP.

An Old Boiler Experiment.

A writer in the Johnstown (Pa.) Tribune, after speaking of the recent boiler explosion at Zug's mill in Pittsburgh, says: "In 1868 the writer was witness to an experiment that was tried for the purpose of ascertaining whether the injection of cold water on the crown sheet of a locomotive, after it was evident that the fluid had nearly all been converted into steam, would produce an explosion, and there were several practical machinists who held stubbornly to the theory that such a result was impossible. A temporary track was laid along the northeast slope at Kittanning Point, in Blair County, and a locomotive that had seen many years of service was run in to a distance of perhaps half a mile, where the test was to be made. In the furnace a roaring fire was built, and a large number of interested gentlemen retired to the safe side of the filling at Horseshoe Bend, where such as were in possession of field glasses could see plainly the indicator or steam-gauge. The hand on the dial moved slowly around until an immense pressure of steam was visible, and it was concluded beyond a doubt that the crown sheet must be red hot, while at the same time a terrible volume of compressed steam was in the boiler.

"Then came the moment when the practical test was to be made. A steam fire-engine had been brought up from Altoona, and a hose connection made in such a way as to force water into the boiler at the proper time—the bluff sheltering those who were operating the machine, so that no casualty might happen. At a given signal the injection was made, but no explosion followed, and the hand on the dial plate rapidly receded until not a pound of steam was visible. This was the result of the first experiment, and the theorists who did not believe in explosions from this cause considered it a vindication of their ideas. But a second attempt was made a few days later to explode the same boiler under the same circumstances. As the indicator moved around the interest became intense, but just as what was considered the proper pressure was arrived at there came a terrific noise, and a chaotic mass of iron gear of the locomotive were thrown down the embankment some sixty feet, while portions of the dome and boiler have not been found to this day. It was an interesting experiment, but, substantially, it proved nothing."

Iron and Steel Rails.

At the recent meeting of the British Iron and Steel Institute, Mr. G. J. Snelius having said that he thought a steel rail superior to an iron rail, however the latter might be made, Mr. Isaac Lowthian Bell, perhaps the most eminent of British metallurgists, who is President of the judges in the group including metallurgy at our World's Fair, said it was a fact that iron rails made from piled iron properly treated had been laid down on a portion of the Northeastern Railway where the traffic was the heaviest, and had lasted longer than any steel rails they had been in the habit of using. He ventured to doubt whether sand was essential to welding, if the iron was properly heated, and this was confirmed by the experience of one of the best welders in the country, whom he had questioned on the subject that morning at Monkbridge Ironworks. He agreed with one of the previous speakers as to the necessity for a revision of the nomenclature of the articles of their manufacture. Of such consequence was this considered by the group of judges over whom he had the honor to preside at Philadelphia, that he held it to be of the greatest importance to have the name of the British Iron and Steel Institute changed. The name of the British Iron and Steel Institute was retained, but the name of the British Iron and Steel Institute was changed to the British Iron and Steel Institute.

Steam on Street Railroads.

The Baltimore Gazette of Sept. 20 says: "Several days ago the announcement was made in the Gazette of the intention of the Citizens' passenger railway line to introduce steam as a motor on their cars. The President of the company, Mr. Jas. S. Hager, has given the subject a very careful and thorough consideration and has just had built by Baldwin & Co., of Philadelphia, a model engine, called the 'F. C. Lat

stockholders to take an appeal as of Oct. 3, 1876, from all the doings of the court in the foreclosure suit; also why the foreclosure proceedings should not be dismissed from the docket of the said Circuit Court for want of jurisdiction in the case.

Memphis, El Paso & Pacific.

Mr. John A. C. Gray, Receiver of this company, announces that the agreement of June, 1874, under which the land grant bonds of this company were to be surrendered to the Texas & Pacific and land received in exchange at the rate of 18 acres for each \$100 in bonds, has been carried out and the lands finally located and certified. A company has been formed called the Franco-Texan Land Company, to which the lands will be transferred. All holders of Memphis, El Paso & Pacific land-grant bonds will be entitled to stock in the Land Company to an amount equal to the face of their bonds. Stock of the Land Company is deposited with Munroe & Co., bankers, of Paris, and will be delivered to bondholders on the surrender of the receipts which they hold for their bonds. Notice will be given hereafter of a meeting to be held for the election of a permanent board of trustees for the Land Company, to replace the present acting officers.

Union Railway, Transit & Stock Yards.

At a meeting of the Indianapolis City Council held Oct. 20, the acceptance by the company of the conditions, under which the city subscription of \$500,000 to the stock was made, was submitted. A motion was made, however, to reconsider the resolutions making the subscription, and, after some discussion, the reconsideration was carried. The resolution was then referred to the City Attorney for a legal opinion upon the questions involved.

Officers of the company say that they have made arrangements for all the money needed to carry on the work, provided the City Council does not take adverse action. There is a question as to whether the Council has power now to refuse to pass the subscription, having once voted it and thus completed a contract with the company.

The City Council subsequently, after receiving several conflicting legal opinions, decided to postpone further consideration of the matter until next January.

Winter Excursion Rates.

A convention of general ticket agents of the lines concerned met in Louisville, Oct. 25, to consider the question of excursion rates and tickets to Florida and other points of resort for pleasure and health travel in the South. It was resolved to adopt substantially the system of round-trip tickets with stop-over privileges that was in force last year. These tickets are to be made good from Oct. 1 to June 1 and are not to be transferable. The rates fixed upon are 2½ cents per mile for all lines north of Louisville and 3 cents per mile for all south of that point. Where there are two competing lines between any two points, the shortest line is to be taken as the basis of mileage. These winter excursion tickets are to be put upon sale at once in all the principal towns of the North and Northwest.

Eastern.

It is proposed to extend the Gloucester Branch from its present terminus at Rockport, Mass., north about 1½ miles to Pigeon Cove, with the intention of making a still further extension through Lanesville to Bayview, some three miles northwest of Pigeon Cove. The people of Cape Ann are anxious to secure the extension and have offered to give the right of way, to subscribe money and work in aid of the line.

Delaware, Lackawanna & Western.

The employees of the Scranton shops are still on strike against the reduction of wages, and neither party appears to be disposed to give way.

The repair shops at Great Bend, Pa., caught fire on the night of Oct. 28 and were destroyed, causing a loss estimated at \$12,000. These shops were of minor importance and were soon to have been abandoned and the work taken to the Scranton shops.

Cincinnati Southern.

The track is now all laid from the Ohio River opposite Cincinnati to Lexington, Ky. From Lexington to the Kentucky River it was laid some time ago, so that there is now a continuous line from the Ohio southward to the Kentucky, about 104 miles.

Track is also laid from South Danville, Ky., southward 21 miles, and another party is working from South Danville northward towards the Kentucky River.

There is still much discussion in Cincinnati as to the entrance of the road into the city. The question of depot grounds has not yet been entirely settled, and a union depot is still advocated. Several lines have been laid down for the road from the northern end of the Ohio bridge to the depot site proposed, but none of them are satisfactory to all the parties concerned.

Galveston, Brazos & Colorado.

A new preliminary line is being surveyed for this road, and it is now proposed to use the track of the Gulf, Colorado & Santa Fe road for some 30 miles from Galveston, laying a third rail to accommodate the narrow gauge. This would save the company the construction of a bridge across Galveston Bay. All work on the old line has been suspended until a decision is reached as to the proposed change.

Albert.

A special meeting of the stockholders is to be held in Hillsboro, N. B., Nov. 10, to vote on the question of ratifying a contract for the construction and equipment of the road; also to vote on the question of authorizing an issue of \$600,000 bonds to be used in payment for the work.

International & Great Northern.

This company now works 507 miles of road, distributed as follows: Main Line, Houston, Tex., to Longview, 236 miles; Huntsville Branch, Phelps to Huntsville, 8; Northern Division, Troup to Mineola, 44½; Western Division, Palestine to Duval, 169; Columbia Division, Houston to Columbus, 49½; total, 507 miles. This will soon be increased by an extension from Duval to Austin, nine miles.

It is said that the Columbia Division is to be extended from Columbus west 14 miles to the crossing of Caney River. Caney River is connected by a canal near its mouth with Matagorda Bay and is now being improved so as to make it navigable up to the point where the railroad will reach it, 50 miles from its mouth.

East Berlin Branch.

Mr. Joseph S. Gitt, Chief Engineer of this line, writes us as follows: "This road leaves the Hanover Junction, Hanover & Gettysburg at Red Hill, one mile from New Oxford and five miles from Hanover, Pa. Commencing at Red Hill it runs in a direct line to Abbottstown, three miles from its starting point, and from that place to East Berlin, four miles, also very direct, the whole seven miles having but three curves, with grades not exceeding 60 feet per mile, and the work light with but one or two exceptions. This road was let in May last to B. B. Goudre & Sons, and already five miles are graded. Mr. Goudre is at work at Abbottstown on a very heavy section of rock, with a large force. It is expected that the entire work will be completed in less than six weeks. The laying of the track, commencing at the Red Hill, was started Oct. 23. It is contemplated to have the entire road in running order by the first of January next."

"The road from the present terminus at East Berlin will be extended to connect with the Harrisburg & Potowmac Railroad near Harrisburg, next spring. This road is to connect with the

Bachinan Valley Railroad, which is to be extended to the Western Maryland Railroad. The preliminary surveys for these extensions have been made by me, at both ends of this road, and it is contemplated to have the road located next spring, and put under contract as soon as it can be got ready. This, when completed, will make the most direct line to Baltimore and South. The road will pass through a rich and fertile agricultural country."

St. Paul & Pacific.

General Manager Farley recently discharged nearly all the passenger conductors on this road on account of alleged irregularities in their returns. Several of them had been on the road for a long time. Their places have been filled by the promotion of freight conductors.

Tennessee & Pacific.

The Nashville (Tenn.) American says: "A good deal of inquiry has been made with regard to the present status of the Tennessee & Pacific Railroad. It is simply this: That Davidson County has decided to sell its interest to the Nashville, Chattanooga & St. Louis Railway Company. As yet, Wilson County has taken no decided action with regard to the sale of the road."

Spring Hill & Parrboro.

This company has secured 2,600 tons of iron rails originally bought from the Grand Trunk Company. The work of track-laying and ballasting for the whole 27 miles of the line has been let to Amasa Killam, of Memramcook, N. B. The rails have been used, but are still in good condition. Two locomotives have been secured for use in construction.

Maxwell Land Grant & Railway.

Our Amsterdam correspondent writes under date of Oct. 18: "The scheme of reorganization of the Maxwell Land Grant & Railway Company, for which a meeting will be held Oct. 19 at Amsterdam, is as follows: A new English company will be incorporated with a capital of \$500,000, and \$300,000 will be borrowed at 6 per cent. by the company from English capitalists. The company will acquire for this sum \$1,000,000 bonds of the Denver & Rio Grande Railroad Company and \$1,000,000 of its stock. The half of the estate will be given to the English company, the rest will remain the property of the Maxwell Company, but in dispute, because the United States Government refuses to give a patent for the grant, whose pretended extent exceeds largely the terms of the Mexican land-grant law of 1824. The scheme does in reality but little more than to procure the means for the Denver & Rio Grande Company to build 75 miles of road. The Maxwell bondholders will profit nothing at all."

Cincinnati, Avondale, Glendale & Hamilton.

A company by this name is to be organized to build a narrow-gauge road from Cincinnati through Avondale, Chester Park and Maplewood to Glendale, with the intention of hereafter extending it to Hamilton. The section to Glendale will be used for suburban traffic chiefly. The capital stock is to be \$300,000.

Pennsylvania Transportation Company.

In Harrisburg, Pa., Oct. 25, argument on the application for the commencement of *quo warranto* proceedings against this company was heard by George Lear, Attorney General, and Wm. McCandless, Secretary of Internal Affairs of Pennsylvania. Arguments were made by W. J. Howard for the Pennsylvania Railroad Company, John Dalzell and John H. Howard for the applicants, and by D. W. Sellers and F. Carroll Brewster for the Transportation Company. The main argument was as to whether the complainants had established a sufficient case against the company to warrant the Attorney General in beginning *quo warranto* proceedings. On this point decision was reserved. It is thought probable, however, that the case will be brought into court.

Illinois Central.

It will be remembered that in 1872 the New Orleans, Jackson & Great Northern and the Mississippi Central companies (subsequently consolidated as the New Orleans, St. Louis & Chicago) issued certain bonds under an agreement with the Illinois Central, which provided that the latter company was to buy up annually \$200,000 of the bonds. Subsequently the Illinois Central issued its own bonds and received in exchange four-fifths of those issued by the other companies. Now it holds that under the agreement it is entitled to redeem 160 of the bonds held by it each year and to purchase only 40 of those held by outside parties. Mr. F. W. Gilley, of New York, however, has begun suit in the New York Supreme Court to enjoin the company from redeeming any of the bonds which it holds and to compel it to purchase all of the 200 bonds from outside holders.

Denver & Rio Grande.

Proposals were to be received Oct. 27 for grading the roadbed from La Veta, Col., the terminus of the La Veta Branch, to the summit of the Sangre de Cristo range, 15 miles, thence down Sangre de Cristo Creek to the mouth of Wagon Creek, 10 miles, thence to a point near Fort Garland, 10 miles, making 35 miles in all. Work was to be begun at once and finished by May 1, 1877. This extension is intended to secure the trade of the San Juan Mining region, which is quite important.

New Castle & Franklin.

It is said that arrangements are being made to build the extension of this road from Stoneboro, Pa., to Meadville which has been talked about for some time past.

Parker & Karns City.

The grading and bridging of the extension from Karns City, Pa., to Butler, has been completed by the contractors, Messrs. Weiss, Britton & Co., and track is being laid from both ends of the line. It is 17 miles long and four miles, from Karns City to Millerstown, has been in operation since Sept. 1. The road will probably be finished by Nov. 1. The road is built nominally by a separate company, the Karns City & Butler, but is really an extension of and owned by the Parker & Karns City Company. That road is now doing a very good business, matters in the Butler oil region being very lively. The road is of 3 ft. gauge, and the completion of the extension will make it 27 miles long.

Vermont & Canada.

President Nichols has issued a long address to the stockholders setting forth the case of the company against the Central Vermont. The last proposition of the Central to purchase the Vermont & Central road, paying therefor \$1,500,000 bonds and \$500,000 preferred stock of the Central Vermont, was promptly rejected. The Central managers now say that they will procure from the Vermont courts an order to sell the Vermont & Canada road. Such an order, it is believed, would have no warrant in law, and even if it should be granted it could be set aside. The result would probably be that the case could be taken to the United States Court, which would be desirable on many accounts. The directors of the Vermont & Canada will continue to do all that is possible to protect and secure the rights of the stockholders.

Sonoma & Marin.

This road, on which considerable work has been done, has been sold to Col. Peter Donahue, who owns the San Francisco & North Pacific road, with which the new line was intended to compete. Col. Donahue agrees to pay for the property \$85,000, the amount paid in and expended on the work. The stockholders are to have the option of receiving the amount

paid in on their subscriptions either in money or in stock of the San Francisco & North Pacific Company, as they may elect. Col. Donahue also agrees to assume and carry out all existing contracts and to complete the road from Petaluma, Cal., to San Rafael, according to the original location, by May 1, 1877. There are also some stipulations as to the running of passenger trains when the road shall be completed.

Northern, of Canada.

The Treasurer of this company has paid over to the Receiver General \$500,000, with interest at 6 per cent. from July 1 to date of payment, being full satisfaction for the lien of the Dominion of Canada on the road as fixed and adjusted by act of Parliament.

Texas & Pacific.

An engineering party lately completed the location of this road on both sides of the Colorado River at Fort Yuma. A small party has been set at work grading on the Arizona side of the river, and work was soon to be begun on the California side also. The engineers are now at work running a new line between Fort Yuma and San Diego.

North Pacific Coast.

This road is now completed to Howard, Cal., 17 miles northward from the old terminus at Tomales, Cal., and within four miles of Russian River. The grading is nearly completed to Moscow, which is to be the terminus on Russian River, and which is about six miles beyond Howard.

White River Valley.

The contract for the grading, masonry, bridges and track-laying for this road has been let to James F. Batchelder & Co., of Springfield, Mass., the work to be completed by Sept. 1, 1877. The Central Vermont Company agrees to furnish the iron and equipment, and is to have a lease of the road when completed. It will be of 3 ft. gauge and will extend from the Vermont Central at Bethel, Vt., southwest to Rochester, about 10 miles.

Gilman, Clinton & Springfield.

The *Commercial and Financial Chronicle* of Oct. 28 says: "It is stated in a London paper that an offer has been made by the Illinois Central Company to purchase the line, paying for the same in their special stock (Springfield Division) either (A) \$2,250,000 in stock, bearing 4 per cent. interest in gold perpetually; or (B) \$2,000,000 in stock bearing 4 per cent. interest in gold for five years, and 5 per cent. perpetually thereafter, also in gold. The Illinois Central Company to assume existing contracts and pay for supplies on hand. The bondholders will have to decide whether they will accept the terms, or undertake the responsibility of working the line on their own account."

If the sale should be made, the Illinois Central would acquire 111 miles of road with an annual charge upon it of \$10 or \$100, gold, per mile, according to which offer might be accepted. The Illinois Central could work the road in connection with its lines better than any other company, and could probably make it earn enough to pay the interest required. In 1874 the net earnings were \$856, currency, per mile.

Denver & Rio Grande.

This company's report for August, covering the main line, 120 miles, only, is as follows:

Freight earnings.....	\$15,867 76
Passenger, express and mails.....	17,378 23
Miscellaneous.....	75 00

Total (\$278 per mile)..... \$33,231 59
Working expenses (62.21 per cent)..... 20,828 60

Net earnings (\$104 per mile)..... \$12,492 90
Of the gross earnings \$779.47 was from transportation of troops, mails and Government freight. As compared with August, 1875, there is an increase of 1.7 per cent. in gross, and a decrease of 8.3 per cent. in net earnings, on the same mileage.

Alabama & Chattanooga.

It now appears that this much-sold road will have to be sold again, Mr. A. P. Balch, who bid it off for \$240,000 at the last sale, not having complied with the conditions. The Montgomery *Advertiser* says: "At the late sale of the Alabama & Chattanooga road at Mobile, it was stated that the requirement by the Court, of \$100,000 cash paid down, was complied with. It now turns out that Balch gave to General Healey, one of the Commissioners of sale, a check for that amount, and that check, instead of being paid, has been protested. Everything is at sea again, and another order of sale will probably be made."

This last sale, which now appears to have fallen through, was made to satisfy the Receivers' debts and costs of court, which the bondholders, who bought at a previous sale, failed to provide for, as required by the terms of their purchase.

Columbus, Chicago & Indiana Central.

The trustees and receivers give notice that they will pay on presentation at the office of A. Iselin & Co., No. 48 Wall street, New York, the coupons due Aug. 1 on the 7 per cent. first-mortgage and 6 per cent. income bonds of the Toledo, Logansport & Burlington Company.

Chicago, Rock Island & Pacific.

In accordance with the mortgage deed 125 of the mortgage sinking fund bonds of this company have been drawn for redemption and will be paid on presentation at the company's office in New York on and after Jan. 1, 1877. Interest upon the bonds drawn will cease from that date. The numbers of the bonds to be redeemed are as follows: 93, 287, 397, 497, 596, 598, 600, 639, 691, 706, 792, 793, 809, 906, 999, 1092, 1104, 1184, 1200, 1290, 1393, 1392, 1506, 1595, 1599, 1603, 1792, 1795, 1869, 1897, 1899, 1995, 2071, 2099, 2207, 2310, 2372, 2400, 2568, 2696, 2700, 2797, 2798, 2808, 2898, 3098, 3191, 3293, 3296, 3592, 3595, 3685, 3694, 4089, 4196, 4203, 4291, 4293, 4299, 4299, 4392, 4400, 4591, 4600, 4753, 4754, 4785, 4807, 4890, 4895, 4985, 5003, 5037, 5099, 5197, 5210, 5318, 5300, 5465, 5495, 5510, 5706, 5793, 5853, 5876, 5907, 5980, 6209, 6406, 6455, 6672, 6700, 6714, 6804, 6874, 6895, 6902, 6906, 6953, 7093, 7110, 7250, 7297, 7372, 7393, 7491, 7501, 7604, 7609, 7695, 7895, 7906, 7998, 8008, 8216, 8301, 8304, 8306, 8398, 8420, 8899.

Georgia Western.

The Fulton County (Ga.) Superior Court has ordered the property of the company, consisting of the partly graded road, charter and franchises, to be sold to satisfy a judgment obtained by Grant, Alexander & Co. The property is to be sold as a whole in one lot, and the sale will be made by the Sheriff of Fulton County, acting as commissioner of the court.

Railroad Conductors' Life Insurance Association.

The annual convention was held in Detroit, Oct. 26, 53 delegates being present. The annual address was delivered by Mr. W. S. Sears, of the Lake Shore & Michigan Southern. The President's address was omitted, President Seymour being prevented by illness from attending. The Executive Committee reported that the total receipts of the Expense Fund for the year were \$3,889, and expenditures \$2,689, leaving a balance now on hand of \$1,200. The total amount of benefits paid during the year was \$22,500, and since the organization \$75,260. The largest amount of benefits paid for the year was \$1,421, the smallest \$1,167, and the average \$1,327. The average amount of benefits paid since the organization was \$2,667. The whole number of membership certificates issued since the organization has been 6,174, of which 2,926 have been forfeited and 1,450 surrendered or withdrawn. During the whole time there

have died 118 passenger and 54 freight conductors; been killed, 19 passenger and 61 freight; and disabled, 15 passenger and 21 freight conductors, leaving a present membership of 1,470. During the past year 25 members withdrew, and 85 proved delinquent. The accident list read as follows: Died, passenger 10, freight 1; killed, passenger 0, freight 3; disabled, passenger 2, freight 1. The affairs of the association have been conducted as economically as possible. The law-suits against the association have all been decided in its favor.

At the close of the first day's proceedings a joint social meeting was held with the delegates to the convention of the Brotherhood of Locomotive Engineers, then in session.

On the second day action was taken on some amendments to the constitution, all of minor importance. The annual election of officers took place, and Mr. J. W. Seymour, Illinois Central, was appointed to deliver the annual address to the next convention. The convention then adjourned.

Peach Bottom.

Local papers state that the York end of this road is doing a fine business. The past six months the road has earned \$20,935.02, which is over 62 per cent. more business than it had done the same six months in 1875.

Wheeling & Lake Erie.

A contract for the construction of a section of 22 miles of this road from Martin's Ferry, O., to a point near the Pittsburgh, Cincinnati & St. Louis crossing, has been let to Mr. Peter J. Keegan, who has fixed his headquarters at Portland Station, Jefferson County, Ohio.

East Line & Red River.

The cars are now running to a point 15 miles west of Jefferson, Tex. More iron has been contracted for and several passenger cars have been ordered.

Decatur & State Line.

A dispatch from Chenoa, Ill., says that Messrs. Ralph Plumb, P. B. Shumway and F. E. Hinckley, all interested in the Chicago & Paducah road, have secured control of this company, which several years ago did some work on a line about midway between the Chicago & Alton and the Illinois Central roads, which was intended to form a new line between Chicago and St. Louis. The intention is to build the line from Bremen on the Rock Island road, near Chicago, south to Strawn on the Chicago & Paducah about 80 miles. That road, being completed to Altamont on the Vandalia Line, will then form, in connection with that road, a new line from Chicago to St. Louis. If we suppose the projected new line from Bremen to Strawn to be very nearly straight, the length of this line from Chicago to St. Louis will be 307 miles, as against 282 by the Chicago & Alton and 298 by the Illinois Central and Vandalia Line.

Ohio Falls & Northwestern.

A company by this name has filed articles of incorporation in Indiana and purposes building a narrow gauge road from Jeffersonville, Ind., northwest to Terre Haute, about 130 miles. There are also to be two branches, one from Jeffersonville through Clarke, Scott and Jackson counties, the other from Linton through Greene and Sullivan counties. The entire length of main line and branches will be 205 miles, and the capital stock is fixed at \$3,000,000.

South Mountain.

At a meeting of the board held in Jonestown, Pa., Oct. 25, the transfer of the contract by Mr. Fisher to Mr. Swope, the new contractor, was approved. It is said that work on the road will be resumed and pushed forward energetically.

Dutchess & Columbia.

The bondholders for whose account this road was bought in at foreclosure sale have organized a new company which they have named the Newburgh & Connecticut Railroad Company.

Richmond & Three Forks.

It is thought that this road will be built before long. The Louisville & Nashville Company has promised aid, provided the counties of Madison, Estill and Lee will assist to a reasonable amount. It is also thought that some help can be secured from Louisville. The road is to be an extension of the Louisville & Nashville's Richmond Branch from Richmond, Ky., eastward to the Three Forks of Kentucky, 44½ miles. The road will tap an extensive lumber country and will give access to large deposits of coal.

Railroad Mail Service Compensation.

After an extended session in St. Louis and the taking of much testimony there the Commission on Railroad Mail Service proceeded to Texas, intending to visit Houston, Galveston and other important points there. This will probably complete their round of inspection and also the taking of evidence and statements, and the rest of the time given to the Commission will be occupied in the preparation of its report.

Georgia Western.

An effort is to be made to raise money enough to complete this road from Atlanta, Ga., westward to Douglasville, some 25 miles. The grading of this section was nearly all done several years ago, when work was suspended and nothing has been done since.

Elberton Air Line.

Work is now in progress on this road, which is to extend from Elberton, Ga., northwest about 50 miles to the Atlanta & Richmond Air Line at Toccoa City, 33 miles northeast of Atlanta. It is the present expectation of the company to have the road finished by next fall. It follows the high ground forming the divide between the Broad and the Savannah River and passes through a well settled and productive farming country, generally high land, and noted especially for its production of grain and fruit. There is also much good timber land on and near the line, and it touches the gold region of Hall County.

Central, of New Jersey.

This company has offered a reward of \$1,000 for the arrest and \$1,000 more for the conviction of the person or persons by whom the switch was misplaced which threw a passenger train from the track at Evona, N. J., during the recent strike. The Brotherhood of Locomotive Engineers has also offered a reward of \$5,000 for the discovery of the guilty party.

In a speech made in Detroit on the occasion of a visit of the delegates to the annual convention of the Brotherhood of Locomotive Engineers to those of the Conductors' Insurance Association, Grand Chief Engineer P. M. Arthur referred to the strike on this road. The *Detroit Tribune* says:

"He stated that the manager of the railroad, Col. Ricker, issued an order reducing the pay of locomotive engineers and firemen 10 per cent. A committee was appointed by the Brotherhood, who waited on the manager, and he promised that the reduction should not take place, or if the Executive Committee would not listen to his protest, he would notify the Brotherhood. Soon after the railroad company began to remove men at different points along the road, thus doubling the runs of the men retained, and obliging them to do double duty for the old wages. Mr. Arthur stated that, according to the rules of the Brotherhood, he was sent for, and after meeting with a committee of engineers he wrote to the manager desiring an interview. This was denied, and all subsequent attempts to meet either Col. Ricker or any of the general officers of the road proved futile. In this dilemma the Brotherhood made a proposition to the company, through the papers, the engineers

who had been running over the road for two years offering to work for \$90 per month, and those who had been at work for a less time for \$75. The officers refused to listen to this or to in any way recognize the existence of the Brotherhood. The manager was then notified that the engineers and firemen would all stop work at midnight, but he laughed at them. That the notification was genuine subsequent events proved, and Mr. Arthur asked, 'Who was to blame for the discomfort of those passengers?'

Manchester & Keene.

The *Nashua (N. H.) Telegraph* says:

"We have reliable information that the recent troubles of the Manchester & Keene Railroad have been adjusted to some extent, and the work of construction is being resumed under the direction of the corporation. The eight miles of road extending from the terminus of the Peterborough Railroad in Greenfield, through the town of Bennington to Hancock, is to be completed and made ready for the rolling stock during the next sixty days and the remainder of the enterprise pushed as speedily as possible to completion.

"The board of managers of this enterprise is composed of wealthy and shrewd men, and the recent course in dismissing the contractors from the work is now better understood and becoming justified. They affirm that the crisis was made to protect the traders, towns and corporations, and from their full statements of the contracts and business relations of the various parties interested it would seem to be the only course that could have been pursued to reach a basis of honorable dealing and save the people along the line from greater imposition than they have already experienced. It appears, as heretofore stated in this paper, that the contractors did not furnish the required sureties and the corporation declined to trust them with its funds or sureties until they had first settled with subcontractors and traders and furnished a good substantial bond of indemnity. This the contractors failed to do.

"It is further shown that the contractors had made no arrangements for the purchase of rails, ties and bridge lumber, as they were bound to do; and so, to protect the corporation and all others who were liable to heavy loss, the managers very properly determined on a departure. It is believed here that the people of Greenfield, Bennington and Hancock, to whom large sums are due for provisions and supplies, will be made whole as soon as the managers can effect a proper basis of settlement for labor that has been done. This belief is so strong that numerous persons who have funds to spare are speculating in due bills.

"We are informed by the managers that the corporation is not in debt nor laboring under financial difficulties; but, on the other hand, the company came to the relief of laborers during the recent troubles, and advanced five or six thousand dollars for their benefit.

"A rumor is current that three of the managers have for some time been secretly purchasing a controlling interest in the stock of the Cheshire Railroad corporation—a scheme manifestly of great importance to the enterprise and those who may thereafter become its patrons—it enabling them to fix freight and passenger tariff to through travel."

Vermont Valley.

In the suit of this company against the Rutland Railroad Company, the Central Vermont Company and others, the United States Circuit Court has decided that the lease executed in 1871 is void and of no effect, never having been legally ratified; that the board of directors chosen by the stockholders is the legal board; that the Vermont receivership is no answer to the complaint and cannot be taken into account in the present suit; that the Central Vermont Company has not been legally in possession since June, 1875, when the old lease expired; that the road must be surrendered to the company and any balance of funds paid over to it. There is talk of an appeal to the Supreme Court.

The road was originally leased to the Rutland Railroad Company under a short lease, which expired in June, 1875. In 1871 the directors voted to execute a new lease to run 20 years from 1875, but this was never legally ratified, and has just been decided to be void. The road was transferred to the Vermont Central trustees when they leased the Rutland Railroad, all the leased lines of the latter being included. By a special clause in the settlement made between the Central Vermont and the Rutland Company some months ago, the Rutland is held clear of all damages or loss which may result from the abrogation of the lease.

The road is 24 miles long, from Brattleboro, Vt., to Bellows Falls, and forms the connecting link between the Vermont Central and Rutland systems and the New London Northern road, and also the line down the Connecticut Valley to Springfield and New York.

Boston, Revere Beach & Lynn.

The stock of this company is to be increased from \$350,000 to \$500,000 for the purpose of making additions to the property and extensions. The directors are also authorized to issue \$150,000 first-mortgage bonds to bear not exceeding 7 per cent. interest, if they deem it wise. The company has now no funded debt, but a floating debt of about \$70,000.

Maple River.

Contracts have been let for the grading of 17 miles of this road from the Chicago & Northwestern at Carroll, Ia., northward. The work is to be completed next Spring. The road is built by the Iowa Railroad Land Company.

Chicago & Lake Huron.

Track on the new section of this line, between Flint and Lansing, is laid to Shiawassee, Mich., 20 miles west by south from Flint. The grading of the whole line of 45 miles is completed, with the exception of a very little work. Trains have begun to run through Flint as far as the Detroit & Milwaukee crossing, about 14 miles.

Arkansas Central.

Mr. Bishop, agent for the English bondholders, has been making an inspection of this road. It is said that he will recommend that, as soon as the foreclosure can be completed and a new company organized, the road be changed to standard gauge and extended to Little Rock.

Pontiac & Orchard Lake.

Arrangements have been made to build a railroad from Pontiac, Mich., southwest to Orchard Lake, about five miles. It will be built on the line surveyed several years ago for the Michigan Air Line. The right of way has nearly all been promised, with a considerable amount of subscriptions to the stock. The estimated cost is about \$35,000. Orchard Lake is a popular resort in the summer, but has not hitherto had visitors enough to support a railroad.

Portland & Oxford Central.

It is reported that the Grand Trunk Company has leased this road and will at once put it in repair and begin to work it. The road runs from Mechanics' Falls, Me., to Canton, 27½ miles, and has not been in operation for three years past, the Railroad Commissioners having pronounced it unsafe and the company being unable to put it in repair.

The Chinese Railroad.

Letters from China in the English papers state that the first fatal accident has happened on the railroad from Shanghai to Oussoon, a man having been killed by the locomotive. The general opinion among the natives, however, was that the man had committed suicide deliberately. A correspondent of

the *London Times* thinks that the railroad is not safe yet from official interference. He says: "The Viceroy of Nankin is said to view it with great dislike and to regard its inauguration as a slur upon his government. He has, I am told, sent two mandarins to make a careful survey of the line and to find out accurately what can be said against it. It is reported that the Taotai wants to resort to the old device of inciting the people to tear up the rails, and that the object of a visit he lately paid to Nankin was to obtain the consent of the Viceroy to the scheme. My informant does not know what view the latter took of the proposal, but of opinion that some measures of decided hostility will be taken before long."

Martha's Vineyard.

This railroad has been attached in a suit for debt and it is said that the company will be put into bankruptcy. It is said that the floating debt amounts to about as much as the road could now be sold for. The road is a narrow-gauge, about 10 miles long, on the Massachusetts island of Martha's Vineyard, and is used only for summer pleasure travel.

Henderson & Overton.

Work is in progress on this Texas road, and a considerable number of men are employed. Seventeen car-loads of iron were recently received at Overton. The road is to extend from Henderson, Tex., northwest to the International & Great Northern at Overton, about 15 miles.

Indianapolis & Sullivan.

The election held last week on the question whether Centre township (in which Indianapolis is situated) should subscribe \$100,000 in aid of this projected road resulted in the defeat of the proposition by a considerable majority.

Eureka & Falisade.

A survey is being made over the Pinto Summit, south of Eureka, Nev., for the extension of this road. Nothing is settled definitely as yet as to how far the extension is to go, or whether it is to be built at all.

Rhode Island & Massachusetts.

The directors have ordered a first assessment of 20 per cent. on the stock, which is made payable Nov. 1, at the Treasurer's office in Providence. The contractors have begun work on the grading, and have already a considerable force employed.

Detroit, Lansing & Lake Michigan.

Messrs. George O. Shattuck, J. L. Stackpole and Charles Merriam, Purchasing Committee, give notice that bondholders who are desirous of participating in the new organization and have not yet signed the subscription agreement for that purpose are requested to call at the company's office, No. 26 Sears Building, Boston, and do so without delay.

Elmira State Line.

This road is now completed, and was formally opened by an excursion over the line Oct. 24. It extends from a junction with the Northern Central two miles south of Elmira, N. Y., west by south to Tioga Junction, near Lawrenceville, Pa., where it connects with the Tioga and the Corning, Owingsville & Anttrim roads. It is intended to form a direct connection between those roads and the Northern Central and Utica, Ithaca & Elmira, principally for coal business. It is 19½ miles long, and will be worked by the Tioga Railroad Company under lease.

From Elmira to the Summit the average grade ascending is 70 feet to the mile and from there to Tioga Junction, 5½ miles, there is a descending grade of 100 feet to the mile. There are two notable iron trestles on the road, one at Alder Run, 732 feet long and 70 feet high, and the other at Stony Fork, 488 feet long and 50 feet high; both were built by the Watson Manufacturing Company of Paterson, N. J. The contractors for the road were A. Wallace & Co., and it was built under the supervision of S. M. Seymour, Chief Engineer, James W. Morris, Assistant Engineer Western Division, and Fred Leach, Jr., Assistant Engineer Eastern Division.

People's Railroad & Ferry.

A company by this name has filed articles of incorporation in California, and purposes building a railroad from Alameda Point southward to Warm Springs, about 40 miles. Its general direction will be parallel with the San Jose Branch of the Central Pacific. The company also intends to maintain a steam ferry between Alameda Point and San Francisco. The capital stock is to be \$2,500,000.

Mobile & Ohio.

Mr. Morris Ketchum, who claims still to be trustee under the first mortgage, on the ground that his removal from that position in 1862 was illegal, has begun suit to foreclose the mortgage in the United States Circuit Court for Kentucky. The United States Circuit Court for the Alabama Circuit has herefore decided against Mr. Ketchum's claim to be trustee.

Keokuk & Des Moines.

Advices from Des Moines, Ia., say that this road is cutting passenger and freight rates somewhat recklessly, and is trying very hard to divert eastern business from the Chicago, Rock Island & Pacific. Its eastern through connection is over the Toledo, Peoria & Warsaw, which joins in the cutting. Passenger tickets from Des Moines are now sold at \$9 to Chicago and \$6 to Peoria, being a reduction of \$2 from the old rates. The distance from Chicago to Des Moines by the Rock Island route is 357 miles; by way of Keokuk, 425 miles.

Mobile & Montgomery.

Reports are current that this road is to be leased to the Louisville & Nashville Company. President Standiford of that company, in his late annual report, urged the necessity of an extension of its line to a Gulf port, which may have given rise to the present rumors.

Car Accountants' Convention.

A convention of railroad car accountants was held in Cleveland, O., Oct. 17. There were present representatives of 56 railroads and fast freight lines, including nearly all the trunk lines and the more important freight lines. Mr. H. F. Crand, of the Louisville & Nashville, was chosen chairman, and Mr. F. M. Luce, of the Chicago & Northwestern, Secretary. Each delegate gave an account of the system of keeping car and mileage accounts on his line, the object of the convention being to prepare the way for the adoption of a uniform system which shall be acceptable to all parties. The proceedings are said to have been very interesting, and good progress has been made towards the attainment of the very desirable object of the meeting.

Detroit, Eel River & Illinois.

This company is trying to secure the extension of its road from the present terminus at Butler, Ind., east by north to a connection with the Chicago & Canada Southern. The distance from Butler to the terminus of that road is about 35 miles, but of this all but 12 miles is graded, and it is said that the Canada Southern will assist in furnishing the rails. The extension would give the road a Detroit connection and a new outlet east over the Canada Southern. Its eastern connection is now with the Lake Shore road.

ANNUAL REPORTS.

The Minor Michigan Railroads in 1875.

The following figures are from the report of the Railroad Commissioner of Michigan for the year ending Dec. 31, 1875, and include all those roads which do not otherwise report. The

mileage and equipment at the close of the year were as follows:

Main Line.	Branches.	Pass. and train other cars.				Freight
		Sidings, etc.	Engines.	Cars.	Cars.	
Chicago & Lake Huron.	232.0	....	9.0	10	13	341
Chicago & Mich. Lake Shore.	170.0	76.0	26.0	25	22	502
Chicago, Saginaw & Canada.	20.0	....	0.8	2	2	19
Detroit, Hillsdale & Southwestern.	64.8	....	3.4	2	4	70
Ft. Wayne, Jackson & Saginaw.	100.0	....	7.5	10	9	291
Grand Rapids, Newaygo & Lake Shore.	46.0	....	4.0	5	5	225
Hecla & Torch Lake.	4.0	0.5	0.5	4	..	154
Marquette, Houghton & Ontonagon.	63.1	25.4	20.4	30	9	1,807
Michigan Air Line.	20.8	....	1.0	2	3	24
Michigan Lake Shore.	57.5	....	3.5	3	4	98
Michigan Midland & Canada.	18.0	....	1.0	1	2	7
Mineral Range.	12.5	....	1.7	3	4	26
Paw Paw.	4.0	....	0.3	1	1	....
Saginaw Valley & St. Louis.	28.7	....	2.7	4	4	55

The gauge of the Hecla & Torch Lake is 4 ft. 1 in., of the Mineral Range 3 ft., and of all the others 4 ft. 8 1/2 in.

The stock and debt of these companies was as follows at the close of the year:

	Stock.	Funded debt.	Floating debt.	Total.
Chicago & Lake Huron.	\$5,775,000	\$5,518,000	\$1,741,551	\$13,054,551
Chicago & Mich. Lake Shore.	1,514,668	6,630,000	1,602,367	9,747,035
Chicago, Saginaw & Canada.	14,500	185,000	75,000	274,500
Detroit, Hillsdale & Southwestern.	1,320,000	24,446	3,400	1,347,860
Ft. Wayne, Jackson & Saginaw.	1,152,060	2,000,000	303,500	3,455,560
Grand Rapids, Newaygo & Lake Shore.	527,600	776,000	290,714	1,594,314
Hecla & Torch Lake.	100,000	....	73,061	173,061
Marquette, Houghton & Ontonagon.	2,306,600	5,456,000	722,822	8,485,422
Michigan Air Line.	300,000	....	....	300,000
Michigan Lake Shore.	450,000	880,000	112,735	1,442,735
Michigan Midland & Canada.	400,000	400,000	....	800,000
Mineral Range.	112,160	183,000	90,678	365,738
Paw Paw.	75,000	16,000	....	90,000
Saginaw Valley & St. Louis.	225,250	446,000	10,431	711,681

The stock given is the amount paid in and outstanding.

The work done and average rates received were as follows:

Train mileage.	Passenger mileage.	Tonnage per mile.	Rate per ton per mile.	Rate per ton per mile.	
				Train mileage.	Passenger mileage.
Chicago & Lake Huron.	359,171	....	....	....	....
Chicago & Michigan Lake Shore.	523,068	....	15,664,012	....	2.26 cts.
Chicago, Saginaw & Canada.	2,500	24,590	....	5.00 cts.	....
Detroit, Hillsdale & Southwestern.	82,510	....	746,635	3.00	"
Ft. Wayne, Jackson & Saginaw.	297,927	....	....	3.00	"
Grand Rapids, Newaygo & L. B.	66,408	1,128,092	....	....	....
Hecla & Torch Lake.	22,356	....	1,086,701	....	....
Marquette, Houghton & Ontonagon.	302,800	1,386,303	14,081,901	4.63	"
Michigan Air Line.	20,224	211,760	127,472	3.80	"
Michigan Lake Shore.	60,260	878,190	10,590	3.00	"
Michigan Midland & Canada.	19,080	....	....	....	....
Mineral Range.	35,042	582,616	488,528	5.00	"
Paw Paw.	10,016	68,416	18,088	....	....
Saginaw Valley & St. Louis.	58,150	861,933	1,029,221	3.20	"
				5.80	"

The Chicago & Lake Huron reports 152,455 passengers and 130,328 tons freight carried, but gives no mileage. The Chicago & Michigan Lake Shore carried 262,478 passengers, mileage not given. The Ft. Wayne, Jackson & Saginaw reports 112,476 passengers and 106,904 tons of freight carried, without giving mileage; this road also reports average rate per ton per mile 1.25 cts. on through and 2.0 cts. on local freight.

The earnings and expenses of the various roads were as follows:

	Earnings.			Expenses.		Net per cent.
	Net	Expenses.	Earnings.	Net	Expenses.	
Chicago & Lake Huron.	\$209,219	\$239,058	\$56,561	\$1,277	\$6,08	86.08
Chicago & Michigan Lake Shore.	622,455	567,235	55,160	2,830	91.00	91.00
Chicago, Saginaw & Canada.	2,163	1,130	1,033	108	82.00	82.00
Detroit, Hillsdale & Southwestern.	64,123	48,122	16,001	940	75.04	75.04
Ft. Wayne, Jackson & Saginaw.	295,845	204,244	91,601	2,958	59.50	59.50
Grand Rapids, Newaygo & Lake Shore.	111,847	87,529	54,318	2,905	51.40	51.40
Hecla & Torch Lake.	40,867	60,457	*19,590	10,217	147.94	147.94
Marquette, Houghton & Ontonagon.	22,339	15,196	7,162	1,596	68.00	68.00
Michigan Air Line.	9,810	59,245	10,565	1,214	84.80	84.80
Michigan Lake Shore.	6,519	6,519	4,358	100.00	....	....
Michigan Midland & Canada.	86,001	67,138	29,863	6,880	66.44	66.44
Paw Paw.	9,729	8,211	1,518	2,432	84.30	84.30
Saginaw Valley & St. Louis.	89,848	36,166	53,682	2,613	40.00	40.00
* Deficit.						

The Chicago, Saginaw & Canada was worked only during the last three months of the year. The Hecla & Torch Lake is exclusively a mining road and is worked entirely for the convenience of the Calumet & Hecla Mining Company, which makes good any deficit incurred.

The only company in the list reporting a dividend during the year is the Mineral Range, which paid one of 10 per cent. in stock. The Chicago & Lake Huron, the Chicago & Michigan Lake Shore, the Ft. Wayne, Jackson & Saginaw, the Michigan Lake Shore and the Michigan Midland & Canada failed to pay all or part of the interest on their bonds during the year. The Marquette, Houghton & Ontonagon also paid only a part of the interest accruing during the year.

Great Western, of Canada.

The latest report of this company covers the half year ending July 31, 1876, during which the road worked was the same as by the last report, a main line from Suspension Bridge to Windsor, 229 miles; the Loop Line from Glencoe to Suspension Bridge, 152 miles, and 115 miles of branches, making 496 miles, of which 481 miles are owned and 15 miles (of the Loop Line) leased. The company also works 238 1/2 miles of leased branches, the earnings of which are not stated.

During the half year the capital account was reduced by the payment of £113,700 6 per cent. bonds which became due July 15, 1876, and increased by the issue of £3,958 new debenture stock. Charges to capital account for new iron bridges and excess of cost of steel over iron rails were £15,018. The total receipts on capital account up to close of the half-year were £9,470,854; expenditures, £9,198,667, leaving a credit balance of £272,187. Since the close of the year the accrued dividends on the 5 per cent. preference stock, amounting to £49,327, have been funded in new preference stock at par.

mileage and equipment at the close of the year were as follows:

Main Line.	Branches.	Pass. and train other cars.				Freight
		Sidings, etc.	Engines.	Cars.	Cars.	
Chicago & Lake Huron.	232.0	....	9.0	10	13	341
Chicago & Mich. Lake Shore.	170.0	76.0	26.0	25	22	502
Chicago, Saginaw & Canada.	20.0	....	0.8	2	2	19
Detroit, Hillsdale & Southwestern.	64.8	....	3.4	2	4	70
Ft. Wayne, Jackson & Saginaw.	100.0	....	7.5	10	9	291
Grand Rapids, Newaygo & Lake Shore.	46.0	....	4.0	5	5	225
Hecla & Torch Lake.	4.0	0.5	0.5	4	..	154
Marquette, Houghton & Ontonagon.	63.1	25.4	20.4	30	9	1,807
Michigan Air Line.	20.8	....	1.0	2	3	24
Michigan Lake Shore.	57.5	....	3.5	3	4	98
Michigan Midland & Canada.	18.0	....	1.0	1	2	7
Mineral Range.	12.5	....	1.7	3	4	26
Paw Paw.	4.0	....	0.3	1	1	....
Saginaw Valley & St. Louis.	28.7	....	2.7	4	4	55

Showing an improvement in the net result of £25,966. The working expenses were 73.63 per cent. in 1876 against 90.32 per cent. in 1875. The earnings per mile, reduced to American currency, were £4,238. The decrease in gross earnings was entirely on through business, the local earnings showing a gratifying increase. The working expenses were reduced by careful economy in the face of extremely low rates on through business, but the condition of the road and equipment has been fully maintained. The receipts per train mile were £4.10 1/2d. for the half year, against £4.11 1/4d. for the corresponding half of 1875, a decrease of 2.5 per cent.

The total loss on the working of the leased lines was £28,366, being £11,622 less than in the first half of 1875. The loss resulted chiefly from the excessive cost of maintenance of way on the Wellington, Grey & Bruce, owing to the original defective construction of that line.

The result for the entire year ending July 31 was as follows:

Main Line.	Branches.	Pass. and train other cars.				Freight
		1876.	1875.	Inc. or Dec.	P.c.	
Chicago & Lake Huron.	232.0	....	9.0	10	13	341
Chicago & Mich. Lake Shore.	170.0	76.0	26.0	25	22	502
Chicago, Saginaw & Canada.	20.0	....	0.8	2	2	19
Detroit, Hillsdale & Southwestern.	64.8	....	3.4	2	4	70
Ft. Wayne, Jackson & Saginaw.	100.0	....	7.5	10	9	291
Grand Rapids, Newaygo & Lake Shore.	46.0	....	4.0	5	5	225
Hecla & Torch Lake.	4.0	0.5	0.5	4	..	154
Marquette, Houghton & Ontonagon.	63.1	25.4	20.4	30	9	1,807
Michigan Air Line.	20.8	....	1.0	2	3	24
Michigan Lake Shore.	57.5	....	3.5	3	4	98
Michigan Midland & Canada.	18.0	....	1.0	1	2	7
Mineral Range.	12.5	....	1.7	3	4	26
Paw Paw.	4.0	....			